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Towards an improved understanding of environmental concern: Development of an environmental concern model, corroboration of previous assessments, and pilot testing original scales.

By

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Research report submitted in accordance for partial requirements for the degree of Masters in Interdisciplinary Global Change Studies in the Faculty of Science at the University of the Witwatersrand.

Supervised by: Professor Edwin Etieyibo

Submitted on: 2018/12/13

Declaration of Originality

I, *Björn Wessel (Student number: 322794)*, a student registered for *Masters in Interdisciplinary Global Change Studies*, hereby declare the following:

- That this is my own original unaided work.
- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.
- Any part of this study that does not reflect my own ideas has been fully acknowledged in the form of citations.
- No part of this thesis has been submitted in the past, or is being submitted, or is to be submitted for a degree at any other university.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Student Signature:  Date: 2017/11/25

Supervisor Signature:  Date: 2017/11/25

University of the Witwatersrand,

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Abstract

The vision for this project is to aid in approaching climate change by providing an improved understanding of environmental concern. There are two missions. First, to develop heuristic models of environmental concern, and to utilize their constructs to assess environmental behaviour and environmental concern in a population. The model is intended to provide a depiction to aid in better understanding environmental concern and may aid in framing and developing intervention strategies to mitigate harmful effects of climate change. Broadly, assessments of environmental concern have been operationalized in two ways, as a unidimensional construct, ranging from high concern to low concern, or as multidimensional constructs demonstrating underlying reasons for environmental concern. Examining two multidimensional assessments reveals limitations of both and gaps between their underlying constructs. A reading of value-orientated theories from environmental ethics literature identifies six constructs for use in a multidimensional assessment of environmental concern. Utilizing equivalent constructs to the previous multidimensional assessments and expanding "nature" and natural entities into three separate categories results in six constructs intended to fill the gaps of the previous multidimensional assessments and may addresses some of their limitations. This reading also provides a theoretical foundation for designing items to relate to the six constructs. A theory map is presented which demonstrates constructs relating to an expanded narrative for use in multidimensional assessments. Climate change is a complex and often poorly understood phenomenon. Furthermore, it is clear that human behaviours are the underlying causes of climate change. Cross-disciplinary research and integration of several disciplines and fields of inquiry are necessary for developing sound approaches to climate change. Experimental philosophy and empirical ethics are discussed as guiding methodologies for this project. Meta-ethical fallacies and two considerations from the philosophy of science aid in contextualizing this research and provide epistemological limits for deriving ethical conclusions from facts about the world. A survey consisting of 11 sociodemographic items, the revised NEP scale's 15 items, an existing 17 item environmental behaviour scale, and six 10 item original scales relating to six constructs based on value-orientated theories from environmental ethics and presented in the heuristic models, was drafted. An electronic version was designed and emailed to first-year Life Science and Economics students. The environmental behaviour scale and the revised NEP scale are significant and correlate moderately positively, corroborating the hypothesis, that there is a relationship between environmental behaviour and environmental concern. While three of the six original scales (egocentrism, sociocentrism, and sentiocentrism) were unreliable, did not have many significant relationships with other variables, and require further development, the other three (nihilism, biocentrism, and ecocentrism) succeeded in corroborating the hypothesis, that there are underlying dimensions of environmental concern, and that they are significantly related to environmental behaviour. The project's implications and recommendations discusses different intervention strategies in response to climate change as well as environmental communications and education, and how the heuristic models may aid in these topic's endeavours. The project concludes by identifying a lack of environmental concern in two South African President's State Of the Nation Addresses and stresses the need to improve environmental concern and increase the frequencies of people engaging in environmental behaviours.

Key words: nature; natural entities; environment; environmental concern; environmental behaviour; value; environmental communication; environmental education; nihilism; anthropocentrism; egocentrism; sociocentrism; sentiocentrism; biocentrism; ecocentrism; experimental philosophy; empirical ethics; quantitative research.

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List of Acronyms

BIO – Biocentrism (scale)

CO2 – Carbon Dioxide

DSP – Dominant Social Paradigm

EB – Environmental Behaviour (scale)

EGO – Egocentrism (scale)

ECO – Ecocentrism (scale)

GHG/s – Green House Gas/es

IPCC – Intergovernmental Panel on Climate Change

NEP – New Environmental/Ecological Paradigm

NGO/s – Non-Governmental Organisation/s

NIH – Nihilism (scale)

SEN – Sentiocentrism (scale)

SOC – Sociocentrism (scale)

SONA – State Of the Nation Address

UN – United Nations

Chapter 1 – Introduction

1.1. Defining the Referent of "Nature"

The terms "natural" "environment", "ecological", their derivatives and conceptions, are arguably non-static, ambiguous, and poorly understood. Roots of the term "Nature" may be traced at least as far back as pre-Socratic cosmologists or "physical" philosophers. '… principal writings of many of them, beginning with Anaximander, seem to have been "Treatises *περί φύσεως*" or "Treatises concerning nature'' (Lovejoy, 1909, 369). 'In fact, it is often said that the Greeks discovered "nature"' (Naddaf, 2012, 1). This suggests that, for at least some ancient Greek academics, defining, conceiving, and understanding "nature" was an important intellectual role. Indeed, Lovejoy suggests that "nature" was '… the primary and most significant subject of their inquiry' (1909, 369). Unfortunately however, Lovejoy continues that '… none of the extant fragments of the [early cosmologists] offer any direct definition of the term…' (1909, 369). Furthermore, the term "*φύσις*" was commonly substituted for with the Aristotelian term "*ἀρχή*" meaning "first principle" (Lovejoy, 1909). To further add to the term's historical complexity, Auffray (2014) notes that our modern word for "Physics" is derived from the same term, "*φύσις*" or "*phúsis*". Naddaf explains that the Greek notion of "*phusis*" is translated into the Latin "*natura*", from which "nature" is derived. Thus, the contemporary terms "Physics" and "Nature" share their roots in the same term, "*φύσις*".

While understanding the aetiology of terms such as "nature" is important for a better understanding where the term and concept arose from, it does not provide clear definitions or accounts of the term. John Stuart Mill offers two definitions of "Nature". As mentioned earlier, "nature" is difficult to conceive and Mill's paradoxical definitions, while providing some insight, do little to dispel the complexity. 'In the first sense, "nature" is identical with the entire world' (Gerson, 2002, 306). This conception of "Nature" more closely resembles the translation of "*φύσις*" as "Physics" in that it refers to everything which exists as "natural". Examined under this definition, everything from the smallest microbe to the most vile and toxic of compounds qualifies as "natural". Extended further, galaxies, solar systems, meteorite impacts, are all conceived as "natural". Gerson contends that this conception '… is broad, factual, and politically neutral' (2002, 306).

This first definition initially appears satisfactory in that it qualifies "nature" as everything which exists however, this qualification does not provide insight into any phenomena conceived of as "unnatural". Indeed, there is something seemingly peculiar in referring to skyscrapers, bridges, and other man-made marvels as "natural" things. Even though Mill's first definition suggests that these things are "natural", Mill's second definition suggests otherwise. Similarly to Katz's argument concerning "nature", where '… human intentionality creates a clear distinction between human artifacts and natural entities …' (2000, 37), Mill adopts a similar line of reasoning. 'Nature has to be understood as what precedes human will and action' (in Gerson, 2002, 306). By expressing that '… all human affairs stay within nature's confines' (Gerson, 2002, 306), no sense can be made of moral or political agendas. This second definition of "natural" conceptually reduces and confines all human actions, behaviours, and products as "artifacts" or "artificial" things, which is readily compatible with an understanding of the term "unnatural".

Neither of these two definitions present any inherent reason to prefer one over the other. Indeed, since "nature" is poorly understood, there may be no sufficient reason to accept one definition over the other. Thus, Mill's definitions result in a paradoxical conception of the "natural" status of some entities i.e., those entities which exist, but were made by humans. Mill's first definition necessitates that those entities are "natural", while the second definition denies that those entities can be "natural", thus resulting in a paradox. While no reasons are apparent to accept or reject one definition in favour of the other, there are some reasons to prefer one definition over the other. Such preferences are based on contextual factors. To briefly illustrate, human-made marvels such as skyscrapers and bridges may be conceived as "natural" in relation to the forces and powers which permit for their constructions and engineering. Thus, being compatible with Mill's first definition of what is "natural". They should not however, be considered "natural" in the same sense as a pristine ecosystem. Undamaged and untouched by humans, a pristine ecosystem meets both of Mill's definitions, but also captures another facet of "nature" not present in either of Mill's definitions, but frequently appearing in theories from environmental ethics – some biotic or living aspect of entities being more "natural" than others. More troubling still for the definitions, is an artificial biotic ecosystem, or an ecosystem comprised of living things but created by humans. While meeting Mill's first definition, Mill's second definition is violated since humans created the ecosystem. This suggests a preference either for Mill's first definition, or appealing to a grey area

between Mill's definitions. Either way, it is clear that "nature" is a complex concept which cannot be easily defined and understood.

Arguably, contemporary understandings of "nature" are conceived as, and represented through, the terms "environment" and "ecology", as well as other terms and concepts derived from it. Ecology is an academic discipline. Originally coined by Ernst Haeckel in 1866, "oecology" is derived from the two Greek words "οικοσ" or "oikos" meaning "house" and "λογοσ" or "logos", referring to the term as an area of study (Schwarz & Jax, 2011). Haeckel selected "oikos" instead of "phusis" as he referred to Ecology's subject area as "the economy of nature" (Hughes, 1994 in Lane, 2016). 'Ecology is inherently cross-disciplinary, drawing together many types of information to address questions about the natural world' (Madin, Bowers, Schildhauer & Jones, 2008). While "ecology" is understood as an academic discipline which informs the "ecosystem" concept, "environment" is understood as the general space where interactions between biotic agents and abiotic materials take place. It is the total sum of a living entity's surroundings. It appears that these contemporary understandings of "nature", to some degree, mirror Mill's definitions. "Environment", as including everything in, and all the space surrounding where interactions take place, appears to resonate with Mill's first definition, where everything is "natural". "Ecology", although strictly speaking is an academic discipline, is concerned with interactions among biotic entities and their environments. It appears concerned primarily with the interactions of non-human biotic agents. While not excluding human influences and interferences, "ecology" suggests some conception of "nature" separate from humans. This is discussed further in Chapter 3 (Subsection 3.4.3) where the changing conceptions of "ecosystems" is discussed and implicated in developing ecocentric perspectives.

1.2. Chapter Breakdown

The purpose of this project is twofold. First, this project aims to understand dominant approaches to, and assessments of, environmental concern. This is used to develop heuristic models of environmental concern research, which display relations of constructs and provide key concepts for developing and incepting value-based environmental ethics into the human population. Second, to provide empirical data to support the final heuristic model and to demonstrate utility of the

various approaches and assessments displayed in the heuristic models (Section 2.5 & 3.6). These purposes include assessing the relationship between environmental concern and environmental behaviour, as well as appraising and assessing underlying dimensions of environmental concern. For convenient and intuitive separation of topics, this project is divided into 8 chapters.

Chapter 2 examines dominant approaches and assessments of environmental concern and environmental behaviour. This aids in clarifying influential research which has previously been published on environmental concern. Unidimensional assessments are discussed as well as two multidimensional assessments. Considering different dimensionalities of environmental concern offers different perspectives and approaches to assessing it. While the unidimensional assessments provide a simple quantitative approach to assessing concern for the environmental, ranging from greatest to least concern, they are unable to account for underlying reasons why anyone might be concerned for the environment – they can measure "how much" but cannot say "why". Multidimensional assessments seek to address this limitation by identifying and categorizing underlying reasons for environmental concern. However, the multidimensional assessments considered in this project are argued to be committed to a common narrative in environmental ethics literature, i.e. focusing too great attention to concepts of the self, other humans, and identifying "nature" and natural entities as a single construct. They either derive their constructs from the common narrative's categorization of the self, other humans, and nature, or place to much emphasis on the human-nature distinction. It is argued that using a single construct for all non-human natural entities is anthropocentric and cannot provide enough insight into different distinctions in values. Chapter 2 concludes by providing and discussing a "Heuristic model of the dominant approaches and assessments" (Section 2.5). This model is intended to display relations of constructs and provides key concepts for developing and incepting value-based environmental ethics. the dominant approaches and assessments of environmental concern

Chapter 3 discusses value-based theories from environmental ethics literature which contribute to an expanded narrative of environmental ethics literature, thus addressing the limitation of utilizing the common narrative in the multidimensional assessments discussed in Chapter 2 (Section 2.3). An initial discussion of intrinsic value as a mind-dependent, subjective attribution clarifies and demystifies intrinsic value and provides a starting point for justifying varying value attributions in

the value-based theories. A brief discussion of metaphysical nihilism and ethical nihilism clarify that a lack of presupposed meaning or value possessed by entities, does not necessitate or imply a lack of moral or values., Anthropocentrism is then discussed as an extension of intrinsic value attribution to humans, with egocentrism and sociocentrism representing discrepancies in this attribution which parallel certain constructs used in the multidimensional assessments described in Chapter 2 (Section 2.3). These theories clearly parallel constructs used in the multidimensional assessments discussed in Chapter 2 and contribute to a deeper understanding of those factors. Sentiocentrism, biocentrism, and ecocentrism are then discussed as theories which contribute to an expanded narrative and more nuanced understanding of concern for non-human natural entities. A brief discussion concerning non-egalitarian, or non-equal, forms of sentiocentrism, biocentrism, and ecocentrism, as well as multi- or poly- centric perspectives towards value-based environmental ethics pays homage to the diversity of thought in environmental ethics literature but also demonstrates that individual variances in value attributions are likely to be wide and complex to categorize. Chapter 3 concludes by providing and discussing two further heuristic models. A "Theory Map" which serves as the second heuristic model and provides a simple representation of the theories discussed in Chapter 3. The third heuristic model amends the theory map to the first heuristic model, presented at the end of Chapter 2 (Section 2.5). This third heuristic model demonstrates a more comprehensive understanding of environmental concern, filling in the gaps between multidimensional approaches (Section 2.3), as well as displaying relations of constructs, providing key concepts for developing value-based environmental ethics in human populations with the vision of addressing climate change. All three heuristic models presented in this project may be useful for educational purposes and aid in framing and conceiving environmental intervention strategies (see Section 7.3).

Chapter 4 serves as a conceptual framework for this project. It provides and discusses factors relevant to the assessment of environmental concern, as presented in the Theory Map at the end of Chapter 3 and is serves to better understand the design and implications of this project and its models. Initially, climate change and the severe weather conditions it predicts are discussed. It is argued that use and integration of multiple disciplines, fields of research, approaches, and perspectives are necessary for approaching and responding to climate change. Experimental philosophy and empirical ethics are presented as suitable interdisciplinary fields of research to

frame this project and provide a methodology to adopt. Additionally, meta-ethical fallacies to avoid, such as the fact-value distinction, and anti-realist conceptions of environmental concern assessments and the heuristic models are discussed

Chapter 5 provides methods used for empirically assessing whether environmental behaviour is related to environmental concern. A quantitative, descriptive, cross-sectional non-experimental design is adopted and a survey consisting of four sections was produced. First, 11 sociodemographic items such as gender and home language were included. The second and third sections respectively borrow Casey & Scott's (2006) environmental behaviour scale and the revised NEP scale (Dunlap *et al*. 2000). The fourth section consists of six 10 item original scales, for a total of 60 items. These items were designed to assess six constructs presented on the theory map towards the end of Chapter 3 (Section 3.6.1). Two subpopulations, first-year Life science and first-year economics students were conveniently sampled on the assumption that a significant difference exists between the samples either in the number or frequencies of environmental behaviours, or in the amount of environmental concern. This assumption was later proven to be valid, and the samples are deemed largely representative of the broader student population. Ethics clearance and permission from various Heads of Schools was obtained, student email addresses were obtained, and the survey was distributed electronically to them.

Chapter 6 analyses the data collected and discusses the results from the study described in Chapter 5. The ordering effect in the study is very noticeable. Of the 196 students who provided informed consent, 139 responded to the Sociodemographic items, 127 responded as far as the Behaviour scale, 117 responded as far as the NEP scale, and 98 respondents completed the entire survey. First, a reliability analysis of the scales is performed and item content analyses discuss relevant aspects of select items. Reliabilities of the environmental behaviour scale and the revised NEP scale are corroborated as sufficient to be considered reliable and providing a single unambiguous assessment of their respective constructs. Of the six original scales, the nihilism, biocentrism, and ecocentrism scales were found to have sufficient reliabilities to consider them as reliable. However, the egocentrism, sociocentrism, and sentiocentrism scales reliability coefficients were too low to consider them as reliable assessments of their intended constructs. Item content analyses demonstrate that instruments intended to assess these constructs require rewriting and further

development if used in future studies. Descriptive statistics, are tabulated and presented as summaries of responses to sociodemographic items, frequencies of engaging in environmental behaviours and levels of agreement with NEP items and the six original scales. Relationships between variables are then presented. An independent sample T test and analysis of variance (ANOVA) were performed on the sociodemographics and the various scales, with results discussing these relationships. Correlations between the various scales were calculated, tabulated and are presented. The relationship between the environmental behaviour scale and revised NEP scale is statistically significant and being a moderate positive relationship. Further significant correlations concerning the six subscales and their relationship with environmental behaviour and environmental concern are discussed. Specific limitations of this study, such as challenges in designing various items and sections of the survey, content and construct validity, contextual relevance, and procedural challenges, are then discussed. A discussion concludes the analysis by describing that the main research question has been addressed, corroborating a moderate positive relationship between environmental behaviour and environmental concern.

Chapter 7 discusses implications for ethics and two types of interventions, which constructs on the theory map may be useful in framing and better understanding. It is expressed that cultivating sound environmental ethics in populations is necessary to address climate change. The two types of interventions discussed are environmental education and environmental communications. Using either of these approaches to cultivate sound environmental ethics in people may help to address climate change. Constructs from the theory map may provide useful to these interventions by helping to better frame and understand appropriate strategies.

Chapter 8 demonstrates a lack of evidence of environmental concern in two South African President's State Of the Nations Addresses (SONAs) and concludes this project with a brief reflection on the work carried out.

Chapter 2 – Review of Environmental Concern Assessments

2.1. Introduction

The introductory chapter expressed that the terms and concepts "nature", "environment", "ecology", and their derivatives are complex concepts and are difficult to define. This suggests that there may be a lot of variance in assessments of concern for "nature" or the "environment". Environmental Concern, as a field of study, has developed a dense collection of research. 'The 1970s saw a spate of scales designed to measure general concern for and knowledge about environmental issues' (Schultz, 2001, 327). While the 1970s may have seen the largest publication of new scales, new theories and approaches continue to be produced.

The purpose of this chapter is to examine dominant approaches to, and assessments of, environmental concern. Arguably, no scale or approach is inherently superior. Since each approach represents a different perspective of the same underlying factor, none can be sufficiently judged as inherently superior. Varying conceptions of "environment" and "nature" suggest further complexity to sufficiently assessing environmental concern. This chapter discusses three assessments of environmental concern (Dunlap, Van Liere, Mertig & Jones, 2000; Stern, Dietz, & Kalof, 1993; Thompson & Barton, 1994) and presents one comparative study (Casey & Scott, 2006). The comparative study provides a behaviour scale and consists of environmental behaviours, or behaviours deemed beneficial to the environment, by Greenpeace Australia (Casey & Scott, 2006; see Section 2.4). Additionally, the comparative study demonstrates relations between behaviours and two of those environmental concern assessments with a frequency scale of environmental behaviours, or behaviours deemed beneficial to the environment, by Greenpeace Australia (Casey & Scott, 2006; see Section 2.4). For purposes of this project, since the revised NEP scale and the behaviour scale both have previously been tested and were found to be reliable. Referred to as "The Established Scales", they may be used for corroborating data and suggest elements relevant to designing environmental concern research for this project.

Initially, the NEP scale (Dunlap & Van Liere, 2008) and the revised NEP scale (Dunlap *et al*. 2000) are discussed as unidimensional assessments of environmental concern in Section 2.2. Treating environmental concern along a single continuum is useful since it provides a clear singular figure representing concern for the environment. The scales' rich history is discussed followed by criticising their purported unidimensionality. Section 2.3 discusses two multidimensional assessments of environmental concern, or assessments which seek underlying reasons for environmental concern. The first two subsections examine two multidimensional assessments. First, an assessment of value-orientations (Stern *et al*. 1993), which categorizes respondents according to their values. Second, an assessment of attitudes towards the environment (Thompson & Barton, 1994), which categorizes respondents according to their attitudes towards the environment. The third subsection critiques constructs of the multidimensional assessments, particularly the "biospheric value-orientation" and the "ecocentric attitude". Section 2.4 concludes this chapter with an examination of a study (Casey & Scott, 2006), which discusses interrelations between this assessment, the NEP scale, and Thompson & Barton's (1994) multidimensional assessment. Additionally, it provides a reliable and relatively short unidimensional assessment of environmental behaviours. This assessment is useful since it provides a clear simple way of assessing frequencies of environmental behaviours in relation to different environmental concern assessments. This chapter concludes by providing the "Heuristic model of dominant approaches to environmental concern" and a brief discussion of the model.

2.2. The NEP Scales

Due to its popularity and widespread use, the original NEP scale, "The New *Environmental* Paradigm" scale (Dunlap & Van Liere, 2008), originally published in 1978, has undergone several renditions. In 2000, revised NEP scale was published, renaming it "The New *Ecological* Paradigm" scale (Dunlap, Van Liere, Mertig & Jones, 2000). A brief history and discussion of the NEP scale is provided. Certain criticisms are levelled against the NEP scales, particularly involving their dimensionality. Due to their widespread use and providing clear singular figures of environmental concern, the revised NEP scale is also utilized in this project as a standardized measure of environmental concern.

The original NEP Scale, the *New Environmental Paradigm* scale (Dunlap & Van Liere, 1978 & 2008), was published in 1978 in *The Journal of Environmental Education* and republished in 2008. Noticing that America suffered from ecological problems, Dunlap & Van Liere (2008) argued that these problems '…stem in large part from the traditional values, attitudes and beliefs prevalent in [their] society' (Dunlap & Van Liere, 1978, 19). The revised NEP Scale (Dunlap, Van Liere, Mertig & Jones, 2000) or the *New Ecological Paradigm* scale, was intended to address weaknesses specific to original NEP Scale (1978). In a retrospective article, Dunlap (2008) presents a detailed development of the NEP Scales. Initially, he draws attention to two earlier studies in which he was involved. Dunlap & Gale (1972 in Dunlap, 2008) compared political views of eco-activists with a representative sample of Oregon students. In the second study, Dunlap used the sample to examine '…relationships among party identification, political ideology, and various indicators of proenvironmental attitudes' (Dunlap, 2008, 5). It is clear that Dunlap drew a great deal of inspiration from political studies in conceiving the first NEP scale. Unsurprisingly, eco-activism was associated with greater liberalism, with Liberals and Democrats exhibiting greater proenvironmental tendencies. Dunlap's subsequent dissertation made partisan differences in proenvironmental voting among members of Oregon Legislature clear (Dunlap & Gale, 1974 in Dunlap, 2008). In 1974, Dunlap taught a graduate class, focusing on the sociology of environmental issues, and utilized a text by Pilrages & Ehrlich (1974 in Dunlap, 2008). That text provided Dunlap with a conceptualization of a "Dominant Social Paradigm" (DSP). Dunlap borrowed his conceptualization of the American DSP from Pilrages & Ehrlich. A DSP is described as '…the prominent world view, model, or frame of reference through which individuals or collectively, a society, interpret the meaning of the external world' (Pilrages & Ehrlich, 1974, 43 in Dunlap, 2008, 5). More specifically, the American DSP of the 1970s was characterised as '…emphasized beliefs in progress, material abundance and the goodness of growth; faith in the efficacy of science and technology; and a view of nature as something to be subdued' (Dunlap, 2008, 5). The first NEP scale was comprised of items relating to three themes: '…existence of ecological limits to growth, importance of maintaining the balance of nature, and rejection of the anthropocentric notion that nature exists primarily for human use.' (Dunlap, 2008, 6).

In the 1980s, the original 12-item NEP Scale had not yet received its subsequent widespread use and popularity however, there was sufficient interest to warrant the creation of a smaller, 6-item version of the scale. Dunlap notes that he struggled through severe depression which prevented him from publishing this shorter version, but acknowledges John Pierce for crediting him with the creation of the shorter NEP which he used in a variety of cross-national studies. It was not until 1992 that a revised NEP Scale was published, although Dunlap admits that it was published too hastily (Dunlap, Van Liere, Mertig, Catton & Howell, 1992 in Dunlap, 2008). The scale underwent a major revision and was published in 2000 (Dunlap, Van Liere, Mertig & Jones, 2000). The revised NEP scale brought many improvements over the original. Although some items remain largely the same, two new themes were incorporated into the NEP. Those themes are, '"human exemptionalism," or the idea that humans—unlike other species—are exempt from the constraints of nature' (Dunlap & Catton, 1994 in Dunlap *et al*., 2000, 432), and "ecocrises" or '… potentially catastrophic environmental changes … besetting humankind' (Dunlap *et al*., 2000, 432). The unbalanced pro- and anti-NEP items of the first scale were also better balanced with 8 pro-NEP and 7 anti-NEP items constituting the second scale. They also modified '… outmoded sexist terminology ("mankind") present in some of the original items …' (Dunlap *et al*. 2000, 432).

It is evident that the revised NEP scale offers advantages of the original NEP scale. However, since items in both NEP scales are derived from themes which are clearly distinct, their dimensionality is the subject of debate. Dunlap notes that the '… most persistent criticism of the NEP scale is that the various versions are not unidimensional…' (2008, 13). Dunlap continues by describing that researchers have found varying amounts of factors, although only a few paint this as a fatal flaw. Since the revised NEP scale received a respectable Cronbach's alpha of .83, and deletion of any item lowers the alpha, '… evidence from this initial survey suggests that the set of 15 items can be treated as constituting an internally consistent measuring instrument' (Dunlap *et al*. 2000, 434). Ultimately, it appears that the dimensionality of the NEP scales is incommensurable. Dunlap suggests that researchers should decide '… on the basis of their data analyses whether to treat it as a single or multidimensional scale' (Dunlap, 2008, 13).

2.3. Multidimensional Assessments

While assessing environmental concern as a single dimension is initially appealing, perhaps its greatest pitfall is that underlying reasons for the concern are not accounted for – it cannot answer *why* anyone may be concerned about environmental issues. Rather, they are limited to expressing *how much* environmental concern anyone may demonstrate. Multidimensional assessments take a different approach to assessing environmental concern, which addresses this pitfall through utilizing multiple constructs to explain underlying reasons for environmental concern. Stern, Dietz & Kalof (1993) describe and define their constructs in relation to value-orientations. Thompson & Barton (1994) describe and define their constructs at environmental attitudes. Both studies are discussed in the two following subsections. In the third subsection, critiquing Stern *et al.*'s (1993) study reveals, what they refer to as, the "common narrative" in environment literature, that being the self, other humans, and "nature". With the common narrative arguably being too anthropocentric, an expanded narrative may include multiple "natural" categories. Criticising Thompson & Barton's (1994) study suggests that constructs should be clearly defined through a rigorous understanding of the environmental ethics source material. This is the focus on the following chapter, where constructs relating to an expanded narrative are defined.

2.3.1. Value-based Approach

Stern, Dietz & Kalof (1993) identified a frustrating disconnection between environmental movement activists with corporations and government agencies, the former accusing the latter '… of trading irreplaceable values for short-term selfish gains …' (322) and the latter accusing the former '… of irrational desires for a risk-free life' (323). Expressing that Dunlap & Van Liere's works began '… research on environmental attitudes…' (Stern *et al.*, 1993, 323). Stern *et al.*'s (1993) study represents an early attempt at linking '… the idea that environmentalism represents a new way of thinking …' (1993, 323) with a social-psychological model.

Stern *et al*. (1993) derive and utilize three constructs which they identify as value orientations. Stern & Dietz express that 'The literature in environmental ethics and the rhetoric of environmentalists and their opponents since the 1970s connects environmental concern to three classes of valued objects: other people, nonhuman objects, and the self' (1994, 66). These objects form the foundations for the value orientations and are connected respectively as, Social-Altruistic, Biospheric, Egoistic and value orientations. These value orientations should not be regarded as mutually exclusive. Discussing each in isolation provides insight their essential qualities, as well as a clear underlying reason for environmental concern.

Stern *et al*. explain that for a purely egoistically orientated person, '… protecting the environment when and only when doing so would have expected benefits for the individual that would outweigh the expected costs' (1993, 326). Social-altruistically value orientated people '…would bear personal costs to safeguard the environment only when doing so would protect other human beings' (Stern *et al*., 1993, 327). Stern *et al*. provide examples of this as '… concerns with the rights of minorities or with poverty' (1993, 327). Additionally, concern for future generations may contribute to social-altruistic values. Instead of a narrow egoistic approach, other human beings, both currently living and those who are not yet born, form the fundamental area of concern. Individuals whose concern only involves the biospheric construct would direct their concern towards '…other species and with natural environments' (Stern *et al*., 1993, 327). Such individuals would exhibit concern '…when species extinction or habitat destruction is at stake, but would be relatively unconcerned when the only effects are on people' (Stern *et al*., 1993, 327). While the authors express that the purist position of a biospheric orientation is echoed '…in the work of deep ecologists and some environmental philosophers, and within the animal rights movement' (Stern *et al*, 1993, 327), this construct is highly subject to criticism. The third subsection below critiques this orientation. Stern *et al*. (1993) consider motivation to act as a product of all the value orientations (V) and consequences for corresponding valued objects (AC). They present their formula for motivation as: $M = V_{ego}AC_{ego} + V_{soc}AC_{soc} + V_{bio}AC_{bio}$ (Stern *et al*., 1993, 328).

Using a systematic random sample of undergraduates, Stern *et al*. developed '…scales to measure beliefs about the consequences of pollution and environmental protection for self, others, and the biosphere' (1993, 332). They then examined the relationship of those scales '…to three measures

of action, and two measures of willingness to pay for improved environmental quality' (Stern *et al*., 1993, 332). Item scales used to assess the three orientations are comprised of three Likert-type items each while a political action scale is comprised of four Likert-type items, for a total item count of thirteen items. While the authors note that the reliabilities of the three orientation scales are only moderate (Theta = .66 (Egoistic), .62 (Social-Altruistic), .56 (Biospheric)), they express that moderate reliabilities are not surprising since they used only a small number of items per orientation (Stern *et al*., 1993, 334). However, the reliability for the Biospheric component is exceptionally low. Additionally, these low reliabilities are attributed to using only three items used to assess each construct. Alternatively, the Biospheric construct is flawed. The political action scale received a moderately strong reliability (Theta = .77), but this is not ultimately useful since reliabilities for the constructs are weak. Comparisons cannot be reliably made. Nonetheless, Stern *et al*. utilize a regression model and '…interpret a statistically significant regression coefficient linking a belief scale to a behavioural intention measure as evidence of an effect of belief on behavioural intention...' (1993, 334).

While Stern *et al*.'s (1993) assessment represents an early attempt at describing underlying reasons for environmental concern and has undergone further theoretical development. Stern (2000) describes his value-belief-norm theory of environmentalism. Beyond the scope of this project to describe, the corresponding model, incorporates the NEP scale as well as a host of other seemingly relevant factors into one single congruent model. Thus, while the biospheric value-orientation is the subject of dispute, Stern *at al*.'s (1993) assessment contributes to advancing an understanding of environmental concern. Stern *et al*.'s distinction between egoistic and social-altruistic value orientations appears to tap into a fundamental distinction of environmental concern. While these two constructs are also subject to receive more development, they are far less disconcerting than the biospheric value-orientation.

2.3.2. Attitudes Regarding the Environment

Thompson & Barton '… suggest there are at least two motives or values … that underlie support for environmental issues' (1994, 149). 'Ecocentric individuals value nature for its own sake …

anthropocentrists feel that the environment should be protected because of its value in maintaining or enhancing the quality of life for humans' (Thompson & Barton, 1994, 149). Additionally, they include a construct not present in the previous model, General Apathy towards the environment or environmental issues. This construct represents a lack of environmental concern and is analogous to a low score in unidimensional scales. While those who are apathetic about the environment do not express concern for the environment, more anthropocentric individuals place their concern for the environment based on what it can provide for humans. More ecocentric individuals place a different type of value on the environment. According to Thompson & Barton (1994), ecocentrists judge that the environment should be protected because it is intrinsically valuable. Thompson & Barton (1994) hypothesize that ecocentric individuals are likely to engage in more conserving behaviours than their anthropocentric counterparts. They base this hypothesis on the notion that anthropocentrists value things such as material quality of life or the accumulation of wealth while ecocentrists '… will act to support the environment even if these actions involve discomfort, inconvenience, and expense that may reduce their material quality of life' (Thompson & Barton, 1994, 150).

Two studies were conducted to test these claims. The first study tested relationships between anthropocentric and ecocentric attitudes against general apathy and self-reported conserving behaviours. Additionally, respondents were asked if they were members of certain environmental organisations and were asked to '…to list their two most important reasons for being concerned about the environment' (Thompson & Barton, 1994, 151). The second study added two additional indicators, willingness to sign up with a student environmental organisation and a more traditional environmental concern scale (Weigel & Weigel, 1978 in Thompson & Barton, 1994).

The first study administered the questionnaire to 'Individuals … at Logan International Airport in Boston…' (Thompson & Barton, 1994, 150). Internal reliability, assessed with Cronbach's alpha, was relatively low in the first study, achieving 0.63 for ecocentrism and 0.58 for anthropocentrism. The apathy scale stands out at an impressive 0.83. Apart from reliability concerns, the first study was successful in corroborating the hypotheses, '…individuals who were more ecocentric expressed less apathy about environmental issues, were more likely to engage in conservation, belonged to more environmental organisations and gave more open-ended ecocentric reasons for

their concern about the environment' (Thompson & Barton, 1994, 151). Those higher in anthropocentrism expressed more apathy, and were less likely to engage in conserving behaviours, than their ecocentric counterparts. Interestingly, anthropocentrists did not belong to fewer environmental organisations nor gave more open ended anthropocentric concerns for the environment. Of the total sample, 66% of respondents did not belong to any environmental organisation however, '…15% belonged to one, 10% to two, and 9% to three or more' (Thompson & Barton, 1994, 151). Additionally, Thompson & Barton (1994) conducted three multiple regressions using apathy, conserving behaviours and, memberships in environmental organisations as dependent variables. 'In all three regressions, both ecocentrism and anthropocentrism entered the analysis and were significant in the final equation' (Thompson & Barton, 1994, 151). This suggests that ecocentrism and anthropocentrism make independent contributions to explain the three dependent variables. Thompson & Barton note that '… the internal reliabilities for the ecocentric and anthropocentric scales could be higher' (1994, 153).

The original scale, used in the first study, was comprised of 7 ecocentric items, 9 anthropocentric items and, 9 apathy items resulting in a 25-item total scale. The second study added 3 new anthropocentric items to the scale, as well as 5 new ecocentric items. This brings the item count to 12 ecocentric items, 12 anthropocentric items and, 9 apathy items resulting in a 33-item total scale. However, 3 anthropocentric items were not used in the final calculation, in order '… to improve the internal reliability of the scale' (Thompson & Barton, 1994, 152). Cronbach's alpha values in the second study were 0.78 for ecocentrism, 0.67 for anthropocentrism and, 0.82 for apathy (Thompson & Barton, 1994, 154). This represents a modest increase in the reliability of the ecocentric and anthropocentric scales and only a slight reduction in the reliability score of the apathy scale. The second study took place on a college campus and utilized a sample of 71 students taking an introduction to psychology course. (Thompson & Barton, 1994). The study was conducted over several weeks, first administering the three attitude scales and the conserving behaviours scale. Several weeks later, a different researcher, presumably unrelated to the previous study, discussed an environmental organisation for the students. After passing around a sign-up sheet to the students, merely 21 participants (30%) expressed interest in being contacted, with ecocentrism being significantly correlated to interest in the environmental organisation.

Ecocentrism was also correlated with conserving behaviours and, apathy, while anthropocentrism '…was not related to any of these variables' (Thompson & Barton, 1994).

Similarly to Stern *et al*. (1993), Thompson & Barton's (1994) constructs are arguably not well defined. However, Thompson & Barton's (1994) constructs do have certain intuitively appealing aspects. Firstly, including apathy provides a construct which demonstrates a lack of environmental concern. Additionally, using only two constructs to explain environmental concern serves as an easy way of contrasting and comparing underlying reasons for environmental concern. Although lacking much depth beyond this dualism, these constructs do provide a simple and straight forward means of differentiating underlying reasons for environmental concern.

2.3.3. Critiquing the Multidimensional Assessments

It is not clear that "value orientations" and "attitudes" are distinct. Thompson & Barton (1994) draw certain similarities between their constructs and Stern *et al*.'s (1993). They suggest that 'Egoistic and social-altruistic values are similar to anthropocentric attitudes because they focus on outcomes for humans' (Thompson & Barton, 1994, 150). The egoistic value-orientation relates to the individual persons, the social-altruistic value-orientation relates to human groups, societies and civilisation in general. Thompson & Barton (1994) describe those value-orientations as related, creating two categories for humans. Noticeably, non-humans and "nature" are not differentiated. Similarities between the biospheric value-orientation and ecocentric attitude are most evident. Since both multidimensional assessments place all non-humans and "nature" into a single category, it is inevitable that those categories bear striking similarities. While compatible with the common narrative, it is unnecessary to adhere to the common narrative, especially when seeking a more nuanced, less anthropocentric understanding of environmental concern.

Stern *et al*. (1993) justify their selection of their constructs by appealing to a common narrative in the environmental literature, which parallel their three constructs. Referring to Merchant (1992 in Stern & Dietz, 1994), who identified three ethics relating to "the common narrative" – the egocentric, homocentric and ecocentric ethics. The egocentric ethic is analogous to the egoist

value-orientation, while the homocentric ethic is analogous to social-altruistic value orientation, leaving ecocentric ethics analogous to the biospheric value-orientation (Stern & Dietz, 1994).

Two objections suggest that the common narrative may be rejected, and an expanded narrative accepted. First, the common narrative may be outdated. Second, it is too anthropocentric. The emerging number of theories and perspective relating to "nature" suggest that the common narrative may be out-dated. Although several non-anthropocentric environmental ethics theories (for example: Taylor, 1981 and Singer, 1998), were published decades before the multi-dimensional scales they may not have been as well established or easily recognized in the early 90s as they are in the present decade where climate change is becoming increasingly more threatening and environmental concern becoming more important. Alternatively, the authors may have desired using less constructs for a more economical assessment. The common narrative may also be criticized for being too anthropocentric, or for placing too much emphasis on humans. Thompson & Barton describe the egoist and social-altruistic value-orientations as '… similar to anthropocentric attitudes because they focus on outcomes for humans' (1994, 150). Since Stern *et al*. (1993) use two constructs relating to anthropocentrism, while treating "nature" and all non-humans as a single construct, they may be criticized as having a preference for humans, and subsequently undermining "nature".

Several features of Thompson & Barton's (1994) assessment and constructs are problematic. First, it may be criticized for also being committed to the common narrative – only two broad attitudes and apathy are considered. Similarly to Stern *et al*.'s (1993) appeal to the common narrative, considering only two attitudes may be criticised for failing to consider an expanded narrative. Ecocentrism clearly functions as Thompson & Barton's (1994) attitude relating to "nature" in the common narrative, while anthropocentrism relates to the category for other humans. The aspect of the common narrative relating to the self may conceptually be linked to anthropocentrism however, a reading of the items in Thompson & Barton's (1994) scale suggests that the self is not considerably important in their scale, being replace with apathy. Nonetheless, some clear parallels exist between the common narrative and Thompson & Barton's (1994) scale. This objection is strengthened when considering that Thompson & Barton (1994) express similarities between their attitudes and the value-orientations. As presented in the paragraph above, the anthropocentric

attitude is relatable to the egoist and social-altruist value-orientations. Additionally, they express that the biospheric value-orientation is '… most similar to what we are defining here as ecocentric motives' (Thompson & Barton, 1994, 150). Thompson & Barton (1994) also take little space to describe their apathy construct, although, they did mention that apathy is assessed by '…items reflecting a lack of interest in environmental issues, and a general belief that problems in this area have been exaggerated' (Thompson & Barton, 1994, 151). While having a deeper understanding of their apathy construct, the crux of the problem lies in developing the anthropocentric attitude and ecocentric attitude on flawed conceptions and intuitions of anthropocentrism and ecocentrism. This may be due to Thompson & Barton (1994) failing to provide any clarification on their conception of intrinsic value. Since anthropocentrism, ecocentrism, and indeed all value-based theories in environmental ethics are based on conceptions of intrinsic value, and what may be intrinsically valuable, having a clear conception of intrinsic value is fundamental for understanding value-based theories (see Section 3.2.1 for this project's conception of intrinsic value).

They describe Anthropocentrists as "utilitarian" because '… nature has value because of what it can contribute to the satisfaction of human wants' (Thompson & Barton, 1994, 150). However, it is not clear that utilitarianism is committed to anthropocentrism. Indeed, Singer's theory (see Subsection 3.4.1), is non-anthropocentric and utilitarian. The ecocentric attitude is equally problematic. Thompson & Barton express that for those with an ecocentric attitude, '… nature has a spiritual dimension …' (1994, 150) and continue '[s]piritualists, like ecocentrics, judge the environment to be a context for enriching the human spirit that has worth independent of its contributions to human materialistic goals' (1994, 150). It is not clear that ecocentrism is dedicated to any spiritual and immaterial beliefs at all. Indeed, evolving conceptions of ecosystems and ecology being position as a hard science, suggest that there is plenty of room for purely material views of ecocentrism. Material views regarding metaphysics resonate strongly with "value subjectivism" (Subsection 3.2.2) and "ethical nihilism" (Section 3.2.3). Failing to have well defined constructs resulted in Thompson & Barton (1994) writing some survey items which do not appear to assess the concept which underlies their attitude constructs. For example, Thompson & Barton's 32nd item reads 'Sometimes animals almost seem human to me' (1994, 153). It is not clear that this item relates only to ecocentrism, nor best to ecocentrism. Since Thompson & Barton's (1994) assessment seeks to differentiate anthropocentric attitudes and ecocentric

attitudes, considering their 32nd item as an ecocentric item is permissible, the underdetermination of theories, discussed in Chapter 4 (Subsection 4.4.2), suggests that their 32nd item arguably relates more strongly with an animal rights construct, such as "sentiocentrism" discussed in the following chapter (Subsection 3.4.1).

This section has discussed two multidimensional assessments of environmental concern and demonstrated that there is room to improve such assessments. While using constructs relating to a common narrative in environmental literature has some advantages, it cannot provide a more nuanced understanding of environmental concern. The following chapter (Section 3.4) presents several value-orientated theories from environmental ethics relating to an expanded environmental narrative.

2.4. Intercomparison Study and Environmental Behaviour Scale

Leichenko & Eisenhauer (2017) express that intercomparisons of environmental behaviour are difficult because of different national contexts and a not having much comparative data of environmental behaviour. Casey & Scott (2006)'s study examines interrelations between sociodemographic variables, the revised NEP scale, Thompson & Barton's (1994) assessment, and their own assessment of environmental behaviours. Consequently, it is useful for this project to discuss Casey & Scott's (2006) results. The provision of an environmental behaviour assessment is very desirable to include in this project since it provides a measure to relate with measures of environmental concern. Casey & Scott constructed their environmental behaviour scale '… using the ecological behaviours recommended by Greenpeace Australia (2001) as desirable' (2006, 59-60) This assessment was '… designed to cover a range of recycling behaviours, consuming behaviours, and conserving behaviours' (Casey & Scott, 2006, 60) and provides a clear unidimensional measure of environmental behaviours.

The survey was administered to student volunteers at Charles Stuart University '… including on-campus and distance education students, and undergraduate and postgraduate students (n = 131). Casey & Scott (2006) assess relations between sociodemographic variables with Thompson & Barton's ecocentric and anthropocentric attitudes and apathy, and to hypothesize that the

ecocentric attitudes correlated positively with environmental behaviours, while the anthropocentric attitude and apathy are hypothesized to correlate negatively with environmental behaviours. Additionally, they seek to '… examine the extent to which kinds of environmental concern and sociodemographic variables can account for variability in reported level of environmental behaviour' (Casey & Scott, 2006, 59). Respectable internal consistencies were found for all measures except the anthropocentric scale at .67. While not terribly low, it clearly trails behind the respectable .81 and .82 respectively for the ecocentric and apathy scales respectively. Additionally, it suggests that anthropocentrism may be assessed by multiple constructs. The revised NEP scale fared better still with an internal reliability of .84. The environmental behaviour scale was found to have '… a respectable Cronbach's alpha of .81' (Casey & Scott, 2006, 63).

The sociodemographic variables of age, gender, education, religion, and politics were assessed. Increases in age was associated with increases in ecocentrism. In relation to gender, women scored higher than men in both ecocentrism and endorsement of the NEP scale, and had lower levels of apathy than men. Levels of education related significantly to concern on all scales. A negative association was found between education level with both anthropocentrism and apathy, and was positively associated with ecocentrism and NEP endorsement. In relation to religion, no significant relationships between any religious groups and ecocentrism were identified. Significant differences were, however, found between religious groups and anthropocentrism, apathy, and NEP endorsement. Worth mentioning are relations between Australian political party groups. Ecocentrism's '… mean score for Liberal/National voters was significantly lower than that of Labor voters … while the Liberal/National mean score on apathy was significantly higher than that of voters for both the Labor and Other Parties group …' (Casey & Scott, 2006, 62). Labor voters' NEP scale mean was significantly higher than Liberal/National voters (Casey & Scott, 2006). 'Frequency of environmental behaviours increased significantly with age, … level of education, … and was significantly higher for women than men' (Casey & Scott, 2006, 63). Additionally, Catholics report the lowest mean of environmental behaviours, followed by Anglican/Uniting, other and non-Christians, and those reporting no religious affiliation reporting highest environmental behaviours (Casey & Scott, 2006). 'There were no significant differences

between the means for proenvironmental behaviours across supporters of various political parties' (Casey & Scott, 2006, 63).

Correlations between scales are also provided. Intuitively, ecocentrism was not significantly related to anthropocentrism (r = -.03), and was negatively related to apathy (r = -.61) (Casey & Scott, 2006). In relation to the NEP scale and Thompson & Barton's scales, all correlations were significant (Casey & Scott, 2006). Ecocentrism positively correlated with the NEP (r = .70), while both anthropocentrism and apathy correlated negatively with the NEP scale (r = -.23 & r = -.70 respectively). The number of environmental behaviours reported significantly correlated with the NEP scale (r = .45) and ecocentrism (r = .43) and negatively with anthropocentrism (r = -.23) and apathy (r = -.47) (Casey & Scott, 2006). These correlations are intuitive because they suggest that Environmental behaviour and environmental concern are indeed related.

2.5. Heuristic Model Demonstrating Dominant Approaches to Environmental Concern

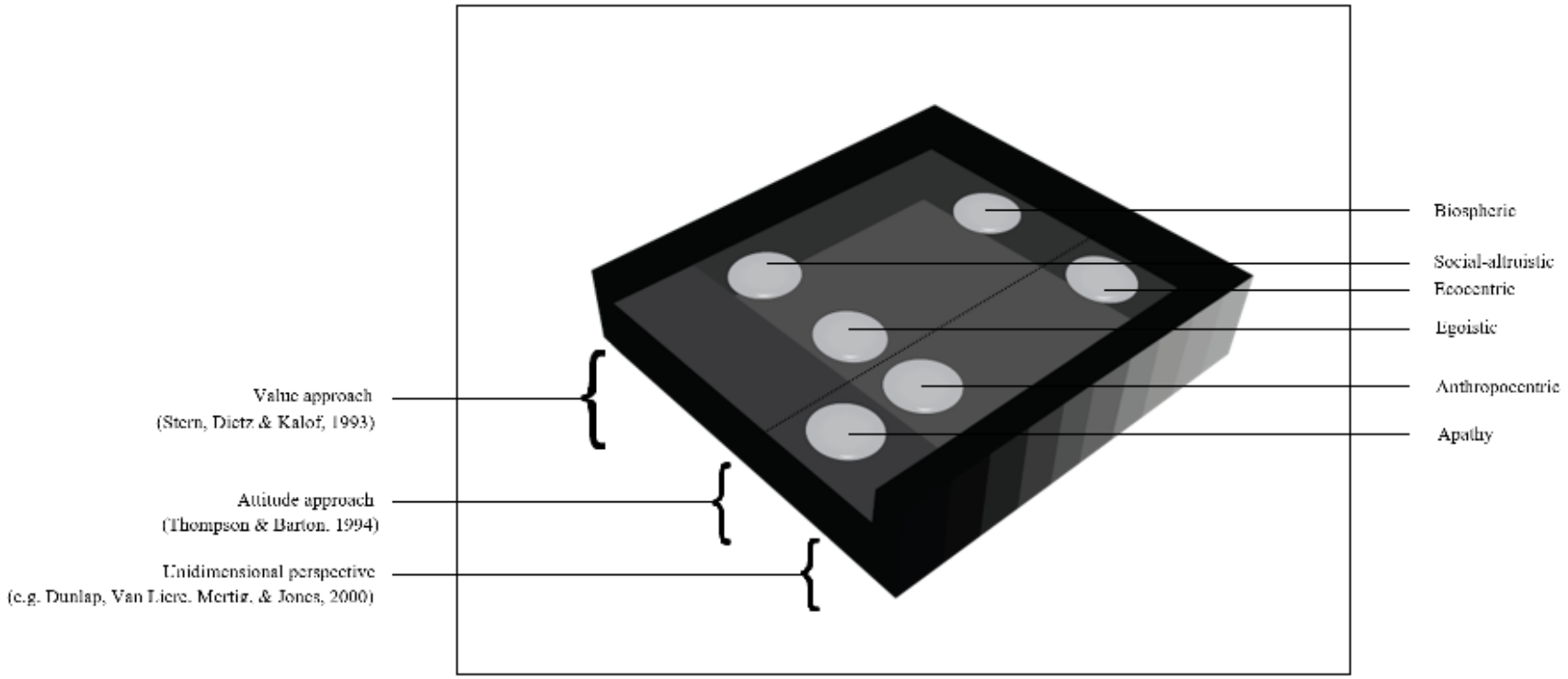

Figure 1. Heuristic model of dominant approaches to environmental concern.

Models may be described as theories in graphic form (Walker & Avant, 2005 in Buck, 2006). Walker & Avant note that '… pretheoretical, schematic models … can act as a heuristic device to study the relationships within the theorizing' (2005 in Buck, 2006). While the model presented here is arguably not pretheoretical, since its concepts and constructs are derived from various theories and approaches, it does act as a heuristic device. It is a heuristic devise in the sense that it clearly portrays the dominant approaches to environmental concern and arranges associated constructs in a logical and intuitive manner. While it is not necessarily an optimal or perfect model, since it fails to display all previous approaches to environmental concern. However, the selected approaches displayed in this model do capture a wide range of views and serves as an overview of some influential research to better understand relations between assessments and constructs. Since this model is not necessarily optimal or perfect, it is subject to improvements or modifications. The third heuristic model, presented at the end of the following chapter (Section 3.6.2), amends the second heuristic model (Section 3.6.1) to the one presented here. This is intended to provide a "deeper perspective" on environmental concern. This will be discussed at the end of the following chapter (Section 3.6).

This heuristic model serves as an aid to understanding relations between unidimensional and multidimensional assessments of environmental concern, by displaying relations of approaches and their constructs. Evidence of relations from Casey & Scott (2006) suggest that environmental concern may be treated as unidimensional or multidimensional.

Both the unidimensional assessments and multidimensional assessments are associated with their own unique set of strengths and weaknesses, each presents a unique perspective on environmental concern and presents valuable lessons and may provide guidelines for future assessments. However, it is not self-evident how the concepts of the unidimensional and multidimensional assessments are related. Trends and relations from Casey & Scott (2006) suggest that increased environmental concern and environmental behaviours are related to holding less apathetic and anthropocentric perspective, and more biospheric/ecocentric perspectives. While these are ultimately assumptions, evidence from Casey & Scott (2006) permit this assumption and justify that it is not unwarranted. However, it is important to note that a person who is mostly egoistically orientated may demonstrate more environmental concern than someone who is more ecocentric.

To illustrate, an egoistically orientated person may place such great emphasis on themselves, that protecting the environment for their own wellbeing is of high important to them, while a person more ecocentric than egoistically orientated person may have a more direct concern for the environment, they may demonstrate less concern overall for the environment. While this does seem unlikely, it is not impossible and is an important consideration.

The figure above represents environmental concern as the rectangular object. The spectrum on the narrow bottom-right face presents the perspective taken in unidimensional assessments, with the darker side on the left representing less/least concern and the lighter side on the right representing more/most concern. The view from the top displays several spheres resting on a level beneath a removed "slice" of the top-side of the rectangle. Each sphere represents a particular construct from one of the two multidimensional assessments. Presenting the spheres beneath the slice indicates that they are underlying concepts of environmental concern and that multidimensional assessments provide a "deeper" perspective on environmental concern. The first line of spheres correspond to Thompson & Barton's (1994) constructs, and the second line of spheres correspond to Stern *et al*.'s (1993) constructs.

Noticing that gaps exist between the two lines of spheres, the presence and absence of constructs between assessments is represented. To make explicit, Thompson & Barton (1994) use apathy but have no construct relating to egoism, while Stern *et al*. (1993) have a construct for egoism, but not for apathy. This demonstrates the gaps between the multidimensional assessments of environmental concern and suggests particular constructs which appear to have high utility and explanatory value. The following chapter discusses these, and further constructs, which should be utilized in a more comprehensive analysis of environmental concern.

Chapter 3 – Review of Value-Orientated Environmental Ethics

3.1. Introduction

Kronlid & Öhman (2013) suggest that environmental ethics theories can be divided into relation-orientated or value-orientated ethics. Relation-orientated theories are concerned with relations between humans and "nature", rather than attempting to determine the sort of values which should be attributed to "nature" (Kronlid & Öhman, 2013). Relation-orientated ethics examines '…how environmental values and the actions associated with those values are created and maintained in various contexts of humans relating to other humans, to nature and to technology.' (Kronlid & Öhman, 2013, 31). Since value-based environmental ethics theories are directly associated with constructs in the multidimensional assessments, discussed in the previous chapter, relation-orientated theories are not discussed further, or utilized in this project.

The purpose of this chapter is to provide a general overview of value-based theories from environmental ethics which may contribute to a more comprehensive analysis of environmental concern. 'Environmental ethics is a normative extension of traditional moral discourse with the aim to incorporate parts or the whole of nature into the domain of moral relevance. Being normative, the concepts of value, good, and worth are crucial. Being an extension, the question of who can properly be said to possess "value," "good," or "worth," is fundamental' (Schönfeld, 1992, 353). The previous chapter (Subsection 2.3.3) argued that the common narrative is too anthropocentric. Gaps present in constructs of the first heuristic model (Section 2.5) suggest that a more nuanced multidimensional approach is possible. This chapter discusses theories which contribute to "the expanded narrative" used in this project. In addition to theories relating to constructs present in the first heuristic model, this chapter discusses sentiocentrism, biocentrism, and ecocentrism as providing sound theoretical bases for constructs in a more nuanced multidimensional assessment. Constructs relating to low/less environmental concern as well as having environmental concern only for the self, as well as constructs providing multiple categories for "nature" may be present in an expanded narrative.

This chapter is divided into five further sections. The following section (Section 3.2) provides an initial conception of intrinsic value by distinguishing it from instrumental value. This section continues by further clarifying intrinsic value as either a mind-dependent, subjective attribution, or a mind-independent, objective property. Arguing strongly in favour of intrinsic value as a mind-dependent, subjective attribution, metaphysical nihilism is a logic consequence of intrinsic value failing to be a property possessed by entities. Metaphysical nihilism is argued to be a trivial truth and does not necessitate ethical nihilism. Ethical Nihilism serves as the first construct for the multidimensional approach in this project and is equivalent to Thompson & Barton's (1994) apathy construct.

The next section (Section 3.3) discusses anthropocentrism, or any view or theory which places humans at the centre of concern. In anthropocentric theories, only humans are attributed with intrinsic valuable while "nature" and natural entities are only considered instrumentally valuable. Two subtypes of anthropocentrism, which have striking similarities to Stern *et al*.'s (1993) value-orientations, are discussed. Egocentrism, or any view that only prescribes intrinsic value attribution to the self, is equivalent to Stern *et al*.'s (1993) egoistic value-orientation. Sociocentrism, or any view that prescribes intrinsic value attribution to other human beings, society, or civilisation in general, is similar to Stern *et al*.'s (1993) social-altruistic value-orientation.

The next section (Section 3.4) discusses theories relating to the expanded narrative used in this project. It is evident that theories typically distinguish supposed intrinsically valuable entities into three discrete categories. Sentiocentrism distinguishes anything which is sentient, or can experience pain, as intrinsically valuable. Animal rights theories strongly characterize this category. Biocentrism distinguishes anything which is alive as intrinsically valuable. Characteristic of this category is including plants, fungi, insects, and potentially some microbial life forms, as intrinsically valuable. Ecocentrism distinguishes entire ecosystems as intrinsically valuable. Instead of individual entities being intrinsically valuable, entire ecosystems, their processes, and interactions between its constituent parts are intrinsically valuable. This permits some non-living entities to be intrinsically valuable in virtue of their contributions to the greater whole. Air, water, and their associated processes with living entities characterise this category.

Section 3.5 identifies a challenge for virtually all theories discussed in this chapter (except nihilism) – the egalitarian problem. Noticing that each theory prescribes attributing value *equally* to *all* entities of a certain type, and that this is realistically impossible, multi- / poly- centric perspectives and non-egalitarian forms of the theories are discussed as means to commensurate this incongruency and better understand how constructs in multidimensional assessments may interact.

The final section of this chapter (Section 3.6) provides and discusses two further heuristic models. The second heuristic model, the theory map, provides a simple representation of the theories discussed in this chapter as constructs. The constructs are displayed as following a similar trend as those in the multidimensional assessments discussed in the previous chapter and demonstrated in the first heuristic model. The third heuristic model amends the theory map to the first heuristic model. Since the theory map follows a similar trend as the multidimensional assessments, it is easy to amend. The third heuristic model demonstrates a more comprehensive understanding of environmental concern, filling in the gaps between the multidimensional approaches discussed in the previous chapter (Section 2.3), and providing additional constructs to better character underlying reasons for environmental concern.

3.2. Value Theory

3.2.1. Intrinsic and Instrumental Value

Value-orientated ethics may be criticised for placing too great an emphasis on the often-unclear concept of intrinsic value (Kronlid & Öhman, 2013). For this reason, it is desirable to clarify this, and associated concepts before discussing any value-orientated theories. ‘Within philosophy, values are typically considered to be a form of ethics—that is, an abstract set of moral principles which when reflected on allow us to arbitrate between situational preferences which might otherwise compete’ (Dewey, 1939; Mead, 1934 both in Corner, Markowitz & Pidgeon, 2014, 413). Narratives of value-orientated theories typically include a conception of intrinsic value and a description of tis relation to particular entities. The distinction between intrinsic value and instrumental value is fundamental to value theory however, instrumental value is far easier to

conceive than intrinsic value. Desjardin expresses that '[i]nstrumental value is a function of usefulness' (2013, 130). For example, a pencil is useful because people can write things down with it – it is instrumentally valuable. 'When such an object no longer has use, or when it can be replaced by something of more effective or greater use, it has lost its value and can be ignored or discarded' (Desardins, 2013, 130).

Intrinsic value, however, is more complex to conceive and identifying entities which may be intrinsically valuable is seldom obvious. Palmer (2003) expresses that when something is valued intrinsically, it is not valued for any reason beyond itself, or what it can be used for instrumentally. In contrast to the instrumental value of pencils, one's own life is not valued because of what it can be used for. Palmer expresses that 'We do not value our lives for any reason beyond themselves; we do not (usually) regard preserving our lives as a means to an end, but rather as an end in itself' (Palmer, 2003, 16). Intrinsic value is a useful way of understanding why certain entities are seemingly considered differently than other entities – they are not valued *more* or *less*, but are of a different type of value.

Instrumental values of natural entities are typically clear – animals may be used for meat, trees may be used for timber, ecosystems may be used for recreation. Intrinsic value of non-humans is far less explicit in an expanded narrative, producing different extensions of intrinsic value attribution. What is explicit though is that entities which are intrinsically valuable should not be harmed – it is valuable and should not be used only for human ends. Desjardins writes, 'When we say that human activity degrades the environment, we are often referring to the loss of or disrespect for intrinsic value' (2013, 131). Subsequently, intrinsic value may be useful for understanding environmental concern.

3.2.2. Value Objectivism versus Value Subjectivism

While intrinsic value may be useful for understanding why some entities are considered differently than others, a challenge is raised – when is something intrinsically valued, and where is this value. Palmer (2003) distinguishes between two competing schools of thought – "value objectivism" and "value subjectivism". Value objectivists believe that intrinsic value '…is not something which

humans create, but something already in the world' (Palmer, 2003, 17). Thus, for a value objectivist, intrinsic value is an objective mind-independent property or possession – intrinsic value is something within intrinsically valuable entities. The defining feature of value objectivism is that entities would continue to *possess* intrinsic value, even in a complete absence of any humans. As Palmer describes, 'From this perspective, valuing nature intrinsically is not *creating* or *projecting* value but rather recognizing value already present' (Palmer, 2003, 17).

Value subjectivism conceives intrinsic value as '…something which humans create and attach to their own lives, the lives of other people, and/or to particular states of affairs (such as pleasure or the avoidance of suffering) or perhaps to qualities such as harmony' (Palmer, 2003, 16-17). Value subjectivism conceives intrinsic value as a subjective, mind-dependent *attribution*. Intrinsic value could not exist without an observer, as an observer is required in order to provide attributions, such as intrinsic value. Conceiving intrinsic value as a mind-dependent attribution demystifies intrinsic value as some sort of mystical or unknowable property. It is as real as an instrumental value, arising from a valuer.

Svoboda (2011) describes a thought experiment which provides a challenging problem for value objectivism. Two possible worlds are conceived. These worlds are similar to the contingent world and are identical in every way to each other, except in one world, intrinsic value is an objective mind-independent property and is *possessed* by at least some entities in that world. In the other world, no entities possess objective mind-independent intrinsic value. The problem for value objectivism is that '…we have no way of knowing which of these two worlds we reside in…' (Svoboda, 2011, 30) – it is not possible to determine which world is which. Since objective mind-independent intrinsic value is not an observable property, entities which are said to *possess* intrinsic value in the one world, would be observationally identical in the other world. As Svoboda expresses that '…there is nothing observable about the entities in the prior world that would warrant inferring that they have mind-independent intrinsic value' (Svoboda, 2011, 29-30).

Since objective mind-independent intrinsic value cannot be discovered by observable properties, value subjectivism is preferred to value objectivism. Value subjectivism provides a preferred

understanding of intrinsic value as a subjective, mind-dependent *attribution*, which better resonates with a contemporary material metaphysical view of the world.

3.2.3. Metaphysical Nihilism and Ethical Nihilism

It might be conceived that without value objectivism's intrinsic value located in objects themselves and value subjectivism limiting intrinsic value to the human imagination, that metaphysical nihilism and ethical nihilism are entailed. It is argued that metaphysical nihilism may be unproblematically entailed, but that ethical nihilism is not and that concluding it from an account of intrinsic value is fallacious.

Hatab writes that 'The strongest aggregate assertion of nihilism is: The world itself possesses no value, human existence is ultimately meaningless, and knowledge claims are without foundation' (1987, 91). This quote represents nihilism towards at least two facets of human experience. "Metaphysical nihilism" relates the world itself having no value. While having no rules, necessity of right and wrong, or refusing any attributions of intrinsic value relates to "ethical nihilism". While only displaying a subtle difference, it is clear that metaphysical nihilism and ethical nihilism do in fact portray slightly different positions. Conversely, it is clear that value subjectivism and metaphysical nihilism are compatible (they make similar claims portray similar worldviews). Both views portray similar views. Metaphysical nihilism suggests that entities in the world cannot have inherent meaning, while value subjectivism agrees that entities in the world do not possess intrinsic value, but permits subjective attributions of intrinsic value. Consequently, value subjectivism avoids the problem that the world itself is intrinsically valuable, while being compatible with metaphysical nihilism.

Ethical nihilism is conceived as the prescription of no *attribution* of intrinsic value to any entities at all, rather than those entities not *possessing* value themselves. Metaphysical nihilism and value subjectivism might be argued to lead to ethical nihilism. Why should entities be attributed with intrinsic value when they do not possess it? While value subjectivism identifies intrinsic value as an attribution from humans onto entities in the world, it subsequently identifies some meaning in the world. However, this is exactly the sort of problem which value subjectivism avoids. Since

humans attribute intrinsic value to at least some entities in the world, there is some meaning in the world, however it does arise from humans. Additionally, attempting to conclude ethical nihilism from metaphysical nihilism or value subjectivism is fallacious. Discussed further in the following chapter (Section 4.4), meta-ethical fallacies demonstrate that moral conclusions, such as prescribing no attribution of intrinsic value, cannot be derived from factual statements alone. While value objectivism, value subjectivism, and metaphysical nihilism seek to demonstrate facts concerning the existence of the world how it is in itself, they alone cannot justify any moral views or prescribed right actions. Additionally, there are reasons to reject ethical nihilism. Pölzler (2014 in Pölzler, 2015) provides three reasons why ordinary people are unlikely to be moral nihilists. Firstly, Pölzler suggests that ordinary people do not have intuitions of moral truths at all. Since nihilism is an intuition of moral truths, or lack thereof, lacking intuitions of moral truths makes being a moral nihilist unlikely. Secondly, if ordinary people do have moral intuitions, '… these intuitions are so vague and confused that they cannot be legitimately ascribed to…' (Pölzler, 2014 in Pölzler, 2015, 204). Third, XXX. Consequently, ethical nihilism is not rationally justifiable and may be rejected as a sound normative moral theory.

3.3. Anthropocentrism

3.3.1. Anthropocentrism in General

Anthropocentrism, or any theory that places humans at the centre of moral concern, '… holds that only human beings have moral value' (Desjardins, 2013, 17). 'Humans have serious duties only to each other' (Rolston, 2003, 519). The only reasons humans may have to defend non-human entities is due to any instrumental benefits which those non-humans may bring to humans, or when non-humans are necessary for human survival, they would need to be protected. Desjardins (2013) explains that while humans do have duties *regarding* "nature", there are no direct responsibilities to "nature". Anthropocentric duties regarding "nature" exist when those duties provide benefits for humans. To briefly illustrate, humans require certain things from "nature". Such things may include food products from plants and animals, and fresh air to breath. Anthropocentric duties towards "nature" only concern the benefits which "nature" gives to humans.

Donahue expresses that '[m]any environmental philosophers today assume that anthropocentrism is deeply implausible. But that assumption is false. Anthropocentrism is a plausible and appealing doctrine' (2010, 59). Donahue (2010) provides three arguments which demonstrate anthropocentrism's appeals. "The argument of special dignity", "The Domination thesis", and "The No-obligation thesis". 'The dignity argument infers that human beings are the only beings in the universe who have a special, unequalled, dignity and rank' (Donahue, 2010, 63). Only those beings which have such dignity are intrinsically valuable. This argument relates to humans having presumed special traits, such as rationality and capacity for higher thoughts. This argument is debunked and rejected by Taylor (1981) and is discussed later in this chapter (Subsection 3.4.2). Donahue explains that when anthropocentrism implies the domination thesis, '… it must hold that the earth and its non-human contents can only have instrumental value, or no value at all.' (2010, 59). No value provides no incentive to prevent something from harm, and while instrumental value necessitates not over-exploiting a resource, it does so only because that resource serves humanity. Thus, humans are permitted to treat nonhumans as they wish. In relation to the non-obligation thesis, Rolston (2003) explains, 'Humans can have no duties to rocks, rivers, nor to wildflowers or ecosystems, and almost none to birds or bears' (2003, 519). The no-obligation thesis implies that humans do not have any reason not to harm nonhumans, apart from when that harm may indirectly cause harm to a human.

3.3.2. Egocentrism

Egocentrism is considered as a non-egalitarian form of anthropocentrism which attributes intrinsic value only to one's self. Both egocentrism and sociocentrism are considered to represent non-egalitarian extreme forms of anthropocentrism. Taking note that a wide range of views and distinctions between the self and human society and civilisation are possible, for purposes of this project, presenting these extremes is sufficient for the expanded narrative. Additionally, egocentrism is analogous to Stern *et al.*'s (1993) egoistic value-orientation, as discussed in the previous chapter (Subsection 2.3.2) and may be construed as "ethical egoism". Rachels defines ethical egoism as 'Ethical Egoism is the idea that each person ought to pursue his or her own self-interest exclusively' (2003, 77). However, the construct in this project uses the suffix "-centrism" conventionally to be consistent with other constructs used in this project.

Rachels (2003) provides insight into ethical egoism by differentiating it from "psychological egoism". Psychological egoism suggests that '… people do in fact always pursue their own interests' (Rachels, 2003, 77). Consequently, anyone who buys into an egocentric doctrine is only required to take actions and adopt behaviours which contribute the well-being of the self. In relation to environmental concern, egocentric environmental concern relates to negative impacts on the self. Egocentrism suggests that environmental behaviours only need to be performed when climate change poses threats to the self. Similarly to how deriving ethical nihilism from metaphysical nihilism is fallacious, as discussed above (Section 3.2.3), deriving ethical egoism as a valid moral doctrine from psychological egoism alone is fallacious. This is discussed further in the following chapter (Section 4.4). Furthermore, Rachels expresses that ethical egoism is not a popular doctrine and that '… the most important philosophers have rejected it outright.' (Rachels, 2003, 84).

3.3.3. Sociocentrism

Sociocentrism is considered as a non-egalitarian form of anthropocentrism which attributes intrinsic value to human societies and civilisations. It represents an extreme non-egalitarian form of anthropocentrism, which attributes intrinsic value to humans collectively, instead of the self or arbitrary groups of humans. Sociocentrism is considered analogous to Stern *et al.*'s (1993) social-altruistic value-orientation, as discussed in the previous chapter (Section 2.3.2). Yet again, the -centrism suffix is adopted to remain consistent with other theories. Two factors are considered relevant for conceiving sociocentrism. Firstly, attributing intrinsic value to humans presently alive and secondly, attributing intrinsic value to future generations who are not yet alive. In relation to other humans presently alive, environmental concern may be directed towards threatening effects of climate change on other people, such as human rights based approaches, poverty and refugee relief, etc. However, determining responsibilities to future generations faces several challenges and is easier to refute than extending value to humans presently alive. Subsequently, this subsection focuses on extending value to future generations not presently alive.

Two arguments demonstrate why future generations may be considered not to be morally considerable. The "argument from ignorance" highlights how little we know about future

generations such as, '… who they will be, that they will be, what they will be like, or what their needs, wants, or interests will be' (Desjardins, 2013, 78). Since, present humans do not know what problems future generations may face, it is difficult to conclude what responsibilities existing humans may have toward those who do not yet exist. This argument may be dismissed based by considering climate change. Climate change informs that present generations do have some idea of what the world will be like, and that past and present generations are acting in such ways as make conditions worse for future generations. Secondly, the "argument from disappearing beneficiaries" concludes '… that it is meaningless even to talk about ethical obligations to future generations' (Desjardins, 2013, 79). This argument expresses that present generations do not even have an obligation '… to bring a generation into existence, because there are no particular people to whom that responsibility is directed' (Desjardins, 2013, 79). Because those people do not exist, there cannot yet be any duties to them. This argument may be responded to by considering over-population and that several human habitats, such as urban areas, are already over-crowded. Indeed, this response suggests that the only main responsibility to future generations, is to bring less human individuals into existence than presently exist.

3.4. Constructs relating to "nature" and natural entities.

Having provided two constructs relating to the common narrative, it is clear that anthropocentric approaches have been dominated large parts of human history and still persist in contemporary times. In 1987, the Brundland Report published what has become the standard definition of sustainable development: 'sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (in Desjardins, 2013, 74). The Brundland Report's definition of sustainable development may be criticized of being too anthropocentric – the only subjects referred to are humans. 'Some educational researchers have highlighted that the concept of sustainable development neglects our relationships with nature, and that as a consequence sustainability simply becomes a matter of human welfare' (Kronlid & Öhman, 2013, 36). While sustainable development is arguably the present generation's best approach to climate change, the definition of such a significant approach, fails to consider, or even mention any non-humans or "nature" – the definition is too anthropocentric. Being too anthropocentric is problematic since it uses the same approach and

thought processes that caused climate change in the first place. Using the same type of thinking to mitigate climate change is likely doomed to failure. An environmental narrative, which more satisfactorily represents non-humans and "nature", is desirable. While an updated definition of sustainable development is desirable that is not the purpose of this chapter or project however, the subsections and theories which follow shed light onto the types of entities to consider when reimagining sustainable development.

3.4.1. Sentiocentrism

Sentiocentrism is the construct which this project uses to represent views that everything sentient, or which can experience pain, should be attributed intrinsic value, or given moral consideration. Sentiocentrists reject the anthropocentric idea that only humans warrant moral consideration and support extending intrinsic value to all sentient entities, or entities that can experience pain. Discussions from two key authors are briefly presented. Singer accuses that '[m]ost human beings are speciests' (1998, 77). Excluding animals from moral consideration, on the basis of them belonging to a different species, is analogous to racism or sexism. Regan (1980), provides three accounts which give reasons not to harm animals. These accounts are provided and discussed. With Singer's (1998) conception of "speciesm", these accounts provide reasons to extend moral concern to all sentient non-humans, or those entities which can experience pain.

Desjardins (2013) expresses that Peter Singer may be the person most closely related to extending philosophical ethics to animals. He makes his position clear when he expresses that "sentience" or '… a convenient, if not strictly accurate, shorthand for the capacity to suffer or experience enjoyment or happiness' (Singer, 1998, 77), is the only defensible boundary of moral consideration. He thus distinguishes views with sentience at the centre of the theory, rather than all living things or ecosystems. 'Singer has argued that our exclusion of animals from moral considerability is on a par with the earlier exclusions of blacks and women' (Desjardins, 2013, 110). Previous prejudices and discrimination led to groups of people such as Africans, homosexuals, and women being considered second-class citizens. (Singer, 1998). Singer explains that, similarly to how '[t]he racist violates the principle of equality by giving greater weight to the interests of members of his own race …' (1998, 77), '… the speciest allows the interests of his

own species to override the greater interests of other species' (1998, 77). Speciesm is thus the prejudice against something on the belonging to a different species, or an inferred superiority on the basis of special traits. Singer explains that by considering our most fundamental attitudes from perspectives of those disadvantaged by our attitudes, a mental switch may be made which permits discovering '…a pattern in our attitudes and practices that consistently operates so as to benefit one group' (1998, 73). Speciesm thus suggests that moral consideration should be extended to sentient entities.

Tom Regan presents three accounts of why causing harm to animals is wrong. These accounts are: Kantian, Cruelty and, Utilitarianism. The Kantian account offers an anthropocentric reason not to cause harm to animals. He explains that people who harm animals '…develop a habit which, in time, inclines them to treat humans similarly' (Regan, 1980, 104). The Kantian account suggests that harming animals is bad because it may lead to harming humans. The cruelty account is based on animals' capacity for pain, and the aversion of that pain is good. 'The reason we are not to kick dogs is that we are not to be cruel to animals and kicking dogs is cruel. It is the prohibition against cruelty which covers and conveniently sums up our negative duties to animals, duties concerning how animals are not to be treated' (Regan, 1980, 105). Regan's third account is a utilitarian account. Noticing that Singer's account is also utilitarian, and moral consideration is prescribed *equally* to all sentient entities, Regan raises an egalitarian problem. In relation to his and his son and his neighbour's son, he may regard that their interests for each's respective son is similar, such as in receiving a degree, being in good health, etc. However, in maintaining his defence of animal rights, Regan expresses that while he treats those sons differently, '… I do not necessarily count their equal interests differently, and neither do I thereby do anything that is in any obvious sense morally reprehensible. I have duties to my son which I do not have to the children of others' (Regan, 1980, 110). Regan may be suggesting a poly- / multi- centric or non-egalitarian approach, discussed further in the next section (Section 3.5).

3.4.2. Biocentrism

Biocentrism is the construct this project uses to represent views and theories that everything living should be attributed intrinsic value, or given moral consideration. Biocentrism rejects both the

anthropocentric idea, that only humans warrant moral consideration, and the sentiocentric idea, that only sentient entities warrant moral consideration. 'Considering plants makes the differences between biocentrism and an animal rights ethic clear' (Rolston, 2003, 521). Biocentrism extends intrinsic value to all living entities, such as trees, plants, fungi, insects, and perhaps even some microbial life forms. Schweitzer's early conception of biocentrism is provided, followed by briefly discussing Taylor's (1981) conception of biocentrism, and more importantly, presenting his argument against humans only deserving moral consideration based on possessing special traits.

Considering that '[p]lants do not have ends-in-view, and in that familiar sense they do not have goals' (Rolston, 2003, 521), it might seem peculiar to suggest that plants have the same rights as humans and animals. On the contrary though, it is evident that the vast majority of biological organisms are not accounted for in either Anthropocentric or Sentiocentric ethics. 'Over 96 per cent of species are invertebrates or plants; only a tiny fraction of individual organisms are sentient animals' (Rolston, 2003, 521). Moral consideration of living entities has been justified by appealing to concepts other than possessing special traits harm, pain or ends. Although suggesting some overlap as a relation-orientated environmental ethic, Schweitzer's "reverence for life" principle represents an early attempt to grant life and living things in general moral concern. 'Schweitzer's original German phrase for "reverence for life" is: "ehrfurcht vor dem leben".' (Desjardins, 2013, 133). With "leben" referring to life, and "ehrfurcht" referring to "reverence" implying '… an attitude of awe and wonder.' (Desjardins, 2013, 133). 'Schweitzer held that the most fundamental fact of human consciousness is the realization that "I am life which wills to live, in the midst of life which wills to live."' (Desjardins, 2013, 133). Schweitzer's reverence for life demonstrates an earlier attempt to attribute intrinsic value to all living things. Taylor argued that 'if we were to accept a life-centred theory of environmental ethics, a profound reordering of our moral universe would take place. We would begin to look at the whole of the Earth's biosphere in a new light' (Taylor, 1981, 198). Taylor's conception of the respect for nature is comprised of three basic elements: '…a belief system, an ultimate moral attitude, and a set of rules of duty and standards of character (Taylor, 1981, 205). Taylor informs that the belief system provides a certain outlook on nature, which enables autonomous agents to adopt an ultimate moral attitude, the respect for nature (Taylor, 1981). Such a belief system constitutes a particular worldview or outlook on nature and involves where humans place themselves in nature.

Taylor argues that special traits, such as those possessed by humans, such as rationality and the capacity for higher thought processes, cannot provide valid reasons for moral differentiation. Taylor argues that humans are only a single species among many, and that several others also exist on Earth. By acknowledging that humans evolved by the same processes as all other species on Earth, humans may place the same moral worth on other entities as themselves. Appealing to human capacities such as '… rational thought, aesthetic creativity, autonomy and self-determination, and moral freedom…' (Taylor, 1981, 211-212) to derive moral worth are insufficient since these capacities are only valuable to humans and to humans alone. Taylor contrasts this notion by naming some traits possessed by other species, which humans lack. '… the speed of a cheetah, the vision of an eagle, the agility of a monkey' (Taylor, 1981, 211) and then question why these traits do not grant those animals moral superiority instead of humans. Attempting to conclude anthropocentrism based on the humans possessing special traits is unjustifiable. Taylor claims that this type of appeal is begging the question. 'Clearly it is from the human standpoint that they are being judged to be desirable and good. … Humans are claiming human superiority from a strictly human point of view' (Taylor, 1981, 212).

Taylor also rejects the notion that certain ecological concepts such as homeostasis, equilibrium and, integrity are necessary as normative principles to derive moral obligations. He explains that ecological concepts such as the balance of nature are not moral norms. Attempting to derive morality from either special traits or ecological principles would be fallacious, discussed in the next chapter (Section 4.4).

3.4.3. Ecocentrism

Ecocentrism is the construct which this project uses to represent views and theories which place ecosystems at the centre of moral consideration. 'Within academic environmental philosophy, ecologically based environmental ethics have begun to dominate the field' (Steverson, 1994, 71). Ecocentrism rejects both the anthropocentric idea, that only humans warrant moral consideration, and the sentiocentric idea, that only sentient entities warrant moral consideration. Furthermore, ecocentrism is the only construct which permits extending value to some abiotic, or non-living,

entities. Since entities such as air and water are involved in functions of ecosystems, they may be valued similarly to biotic, or living entities. 'Though they vary in their specific usage of ecological models and concepts, proponents of such ethics argue that only "ecocentric" approaches can provide the conceptual framework necessary adequately to express the true extent and force of humanity's obligation to nonhuman nature' (Steverson, 1994, 71). This section begins by briefly presenting Leopold's "land ethic" which provides '… the first systematic presentation of an ecocentric ethics' (Desjardins, 2013, 179). The land ethic, while having been influential, is based on the outdated organic ecosystem model. The "ecosystem models" of ecosystems are discussed since they offer more satisfactory accounts of what ecosystems are. Finally, "chaos theory" provides a more recent interpretation of ecosystems. Chaos theory is briefly discussed in relation to ecosystems and is expressed not to lead to ethical nihilism.

'Aldo Leopold, a forest-ecologist and prophet of environmental ethics, claimed, famously: 'A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise' (Rolston, 2003, 524). Similarly to Singer (1998), Leopold also noticed that some humans were previously disadvantaged. Describing the story of Odysseus, on returning to his home from his journey, Odysseus had several female slaves hanged for misbehaving. Since slaves were viewed as property, rather than having any of their own rights, their hanging was not viewed as wrong or unethical. Much like how Singer (1998) extends moral consideration to animals that can experience pain, and Taylor (1981) extends moral consideration to all living things, '"The Land Ethic" is Leopold's call to continue this extension of ethics to include land, plants, and animals' (Desjardins, 2013, 180). Leopold suggested '… that ecology revealed an understanding of the modern world very different from the modern mechanistic, and still dominant, scientific worldview' (Nelson, 1998, 742). "Nature" is often viewed in a mechanistic manner. Since ethics are influenced by how the world is viewed, '… our actions with regard to nature have corresponded to this view of nature as a machine' (Nelson, 1998, 742). 'Leopold suggested that our assumed knowledge of the world … greatly affected our vision of the world' (Nelson, 1998, 743). Leopold believed that improving understandings of ecology could aid in the development of better ethical theories. 'By attaining an ecological understanding of the world, one begins to see such things as tinkering and engineering approaches to environmental management in a different light. One becomes much more cautious and sceptical about

environmental meddling' (Nelson, 1998, 743). Evident in the land ethic is the idea that factual understandings of ecosystems influence and may lead to more developed ethical theories. As Nelson notes, '[m]uch of what we take to be the facts of the working world-our worldview-come to us through science. And many of the environmental facts that we hold to be true have come to us more recently through the science of ecology.' (1998, 742). Desjardins (2013) provides four historical models of Ecology, each of which provides a different way of interpreting environmental facts. These are "the organic model", "the community model", "the energy model", and "chaos theory".

In the organic model, constituent parts of ecosystems have a similar appearance to organs of a body. Species and individuals are related to ecosystems '… in the same way that organs are related to the body' (Desjardins, 2013, 163). The organic model places ecologists into a similar role as a physician. 'Just as the physician studies anatomy and physiology to determine the normal and proper function of the body, the ecologist studies a habitat—temperature range, rainfall, soil conditions, and so forth—to determine the normal and proper functioning of that area' (Desjardins, 2013, 164). Ecosystems '… can therefore be described as healthy, diseased, young, mature, and the like, according to a normal and natural developmental standard' (Desjardins, 2013, 163-164). Viewing ecosystems in this way is useful for several practical reasons. Most notably, it permits for discussing ecosystems in terms of health and subsequently makes discussing policy and ethical conclusions easier to derive. 'Just as we speak of the health and well-being of individual organisms, we can speak of the health and well-being of ecosystems' (Desjardins, 2013, 164).

'By the early twentieth century, the organic model had begun to fall out of favour among ecologists' (Desjardins, 2013, 165). The organic model is flawed for several reasons. One such reason is that it assumes that there is an end to the development of ecosystems however, '[n]atural biotic communities do not always develop toward some one single organic whole' (Desjardins, 2013, 165). In 1935, Tansley introduced the "ecosystem model" and defended '… the concept of an ecosystem as a more appropriate model for ecological research' (in Desjardins, 2013, 165). 'Tansley wanted to keep ecology connected with the more legitimate physical sciences by replacing the language of complex organisms with the language of physical systems' (Desjardins, 2013, 166). Ecosystems are understood systems comprised of communities and examine energy

transfers between entities, '… from the point of view of the ecologist' (Desjardins, 2013, 165). Ecosystems are not entities which can be directly observed, the idea of what they are, is dependent on the observer. To illustrate, consider attempting to determine where one ecosystem concludes, and another begins. The organic model may readily describe this as collections of different species which have an appearance similar to an organ. The ecosystems models however permit that ecologists may determine where to consider the beginning and ends of ecosystems, based on contextual factors. While drawing ecological boundaries in this manner may seem somewhat arbitrary, it permits ecologists to take measurements and draw conclusions based on different scenarios and contexts. Furthermore, the ecosystem model permits drawing a very wide boundary. Related both to improving the understanding of climate change, and involved in rejecting "geocentric" as a further possible construct, an ecosystem model's boundary may encompass the entire global, resulting in a "global ecosystem" being the subject of consideration. Drawing such a wide boundary enables climate change to be identified as a global phenomenon. This conception of ecosystems, as entities resonates strongly with the value subjectivist conception of intrinsic value, as a subjective mind-dependent property, and permits taking situational factors and the context of ecosystems into account for moral consideration.

"Chaos theory" serves as a modern response to the conception of the ecosystem, as brought about by ecosystem models. 'Indeed, the very notion of an ecosystem has become suspect in some quarters. A number of ecologists now investigate the dynamics of "patches" of land, giving up on the idea of homogenous ecosystems' (Hettinger & Throop, 1999, 9). Desjardins explains that chaos theory, influenced by mathematics and science, '… suggests that ecosystems are constantly changing and, perhaps more important, that this change occurs without direction or any sense of "development' (2013, 169) and have '… no balance or long-term equilibrium exists within natural systems' (2013, 169). Ecosystems are presented as a seemingly random collection of entities, whose population and communities are constantly subject to change, rather than development (Desjardins, 2013). Instead of discussing development of populations and communities, ecosystems may be analysed by their present state and described in relation to impacts and changes on populations and communities. Furthermore, this goes so far as to include the human population in the conception of the ecosystem, thus providing some commensuration to the human-nature paradox discussed in the introduction of this project. Human interaction with "nature" is described

as impacts on, and changes caused to, populations and communities. This is the same way as describing impacts on, and changes caused to, populations and communities in the same way as non-humans. Thus, human behaviour may be viewed as a part of nature, rather than outside of it.

3.5. The Egalitarian Problem and Responses

3.5.1. The Egalitarian Problem

Recognising that a biocentric egalitarian position had become espoused by many ecological movements, French (1995) finds the claim problematic that all living entities have equal inherent moral value. Furthermore, French notes that many biocentric egalitarians '… are not, on close examination, the radical egalitarians that they first appear to be' (1995). This demonstrates the unrealistic demands which egalitarian forms prescribe. Anthropocentrism, sentiocentrism, biocentrism, and ecocentrism may be referred to as "egalitarian" since all entities are prescribed *equal* value, relative to each category. For example, an egalitarian sentiocentrism would be required to value all sentient animals capable of experiencing pain equally. Those animals in one's immediate domain, as well as those on the other side of the world who may never be encountered, all must be valued equally and require equal consideration and moral deliberation. Such egalitarian forms are problematic because they represent extraordinarily unlikely scenarios, to the point that egalitarian theories may be criticised as being too demanding, requiring unrealistic or impossible actions.

3.5.2. Multi- / Poly- centric Perspectives

Rabb (1992) noticed that anthropocentric, sentiocentric, and biocentric perspectives are often treated as mutually exclusive. And takes exception that '… any one of these three positions should be or even could be accepted as an alternative to the others' (Rabb, 1992, 177). Instead, Rabb (1992) argues for a compatibilist poly-centric approach to environmental ethics where anthropocentrism is not outright rejected in favour of sentiocentrism or biocentrism. Rabb argues that the concept of individual human rights '… is just too hard won to reject in favour of some

supposed better ideal' (1992, 178) and '… what is required is a poly-centric perspective that accommodates and does justice to all three positions in question' (1992, 178).

Similarly to Rabb (1992), Weston (2004) rejects the notion that any single centrism is sufficient, also arguing for a compatibilist approach. Arguing for a multi-centric approach to value-based environmental ethics, '… according to which more-than-human others enter the moral realm on their own terms, … according to which there are diverse centres, shifting and overlapping but still each with its own irreducible and distinctive starting-point.' (Weston, 2004, 26).

Both of these authors have noticed that no single approach is entirely sufficient. With each theory presenting their own unique strengths and weaknesses, multi- or poly- centric approaches seek to address the egalitarian problem by adopting a compatibilist position. However, adopting a compatibilist position fails to address conflicts between the theories. To briefly illustrate, when faced with saving either an animal or human life, multi- or poly- centric approaches fail to prescribe the correct action. Consequently, they fail to commensurate the theories and sufficiently address the egalitarian problem.

3.5.3. Non-egalitarian Forms

Non-egalitarian forms of the theories seek to address the egalitarian problem, not by adopting multiple approaches, but by denying the mutual exclusivity of approaches. Instead of treating anthropocentrism and sentiocentrism as discrete, varying quantities of attributable value are permitted between both. For purposes of this project, Strong-forms are understood as a decreased attribution of value to humans and increased attribution of value to "nature" or natural entities. Weak-forms are understood as an increased attribution of value to humans and decreased attribution of value to "nature" or natural entities. To illustrate, a subject may value both humans and animals, but may value humans either more or less than animals. If the subject values animals more than humans, but does value both, they may be referred to as a strong sentiocentrist. If however, the subject values humans more than animals, but does value both, they may be referred to as a weak sentiocentrist. The same logic would apply to biocentrism and ecocentrism as well. Strong and weak forms of anthropocentrism are not possible in this example, since varying levels

of value for humans is what has been used as a modifier to determine the non-egalitarian type of either sentiocentrism, biocentrism, or ecocentrism.

Watson labels anti-anthropocentric biocentrism, or a strong-form of biocentrism, as '… the position that human needs, goals, and desires should not be taken as privileged or overriding in considering the needs, desires, interests, and goals of all members of all biological species taken together, and in general that the Earth, as a whole, should not be interpreted or managed from a human standpoint' (Watson, 1983, 245). Since Watson's anti-anthropocentric biocentrism includes a good for the "Earth as a whole", it does not appear to differentiate between biocentrism and ecocentrism. While the line between those two theories may not always be clear, it does take humans into account and extends or places greater moral consideration on them. This is an important factor which suggests permitting discrepancies in the amount of intrinsic value attributed to humans and non-humans. While attempts to justify strong-forms face a challenging difficulty – they effectively argue against pursuing one's own good – their justification is not impossible and at least some people are likely to hold such a position. To illustrate, noticing that humans are the central causes of several cruel acts against sentient animals, such as in factory farming, that so many individuals are being killed that species are going extinct at a rate well beyond the background extinction rate, and that the integrity of global ecosystems has been compromised, it is not difficult to imagine why some might find fault in human actions and attribute less value to them. This project refers to such theories as "Strong forms" – those theories which attribute intrinsic value to some non-human entities, but attribute *less* or *no* intrinsic value to humans.

Since non-egalitarian accounts '…hold that some living things possess greater inherent worth than others, and because they emphasize cognitive complexity, they easily can promote some human concerns over the needs of other individuals' (Durland, 2008, 402). Weak-forms of the theories extend moral concern to some non-humans and "nature", they permit extending more moral concern to humans. For example, Coren's view of 'anthropocentric biocentrism … says that human beings ought to promote the survival of our own species above the survival of other species' (Coren, 2015, 48). In contrast to anti-anthropocentric strong-forms of the theories, anthropocentric weak-forms of sentiocentrism, biocentrism, and ecocentrism increase the amount of intrinsic value

attributed to humans without denying non-humans and “nature” to the attributed intrinsic value. These provide further considerations than a purely linear conception of intrinsic value attribution.

3.6. Two Heuristic Models

3.6.1. The Theory Map as a Heuristic Model of Environmental Concern

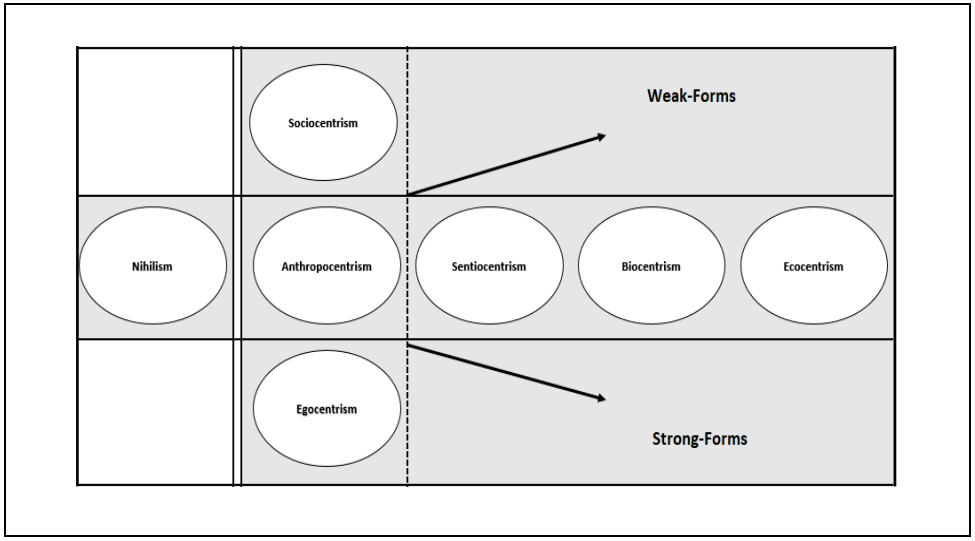

Figure 2. The theory map as a heuristic model of environmental concern.

The theory map presented above is intended to provide a more comprehensive analysis and provide more nuanced constructs for a multidimensional approach of environmental concern than the previous multidimensional approaches (Section 2.3). It illustrates constructs, based on the theories presented in previous sections of this chapter. Similarly to the first heuristic model (Section 2.5), the theory map is also heuristic. It demonstrates relations between discrete underlying constructs of environmental concern. Appendices M & N contain colourized examples of the theory map.

Hypothesised trends and relationships among constructs are also demonstrated. Similarly to how the first heuristic model positions its constructs based on evidence from Casey & Scott (2006), the theory map positions constructs in a similar manner, utilizing parallels between previous multidimensional approaches and this one. Constructs presented towards the left side of the map indicate less value attribution than constructs presented towards the right side. While nihilism represents a lack of value attribution, anthropocentrism, and its two forms, indicate less overall value attribution than sentiocentrism, biocentrism, and ecocentrism. The arrows above and below sentiocentrism, biocentrism, and ecocentrism indicate non-egalitarian forms of those theories. Presenting weak forms, which permit more value attribution to humans but also to other entities, on the same horizontal axis as sociocentrism demonstrates greater total value attribution than the strong forms and egocentrism, presented on a lower horizontal axis. Consequently, a weak form of ecocentrism in the top right-hand corner is the construct associated with the greatest value attribution, while nihilism and egocentrism towards the left and bottom are the constructs associated with the least value attribution. It is expected that environmental concern and behaviours is strongly related to value attribution and follows the same trend. Nihilism is expected to represent the least environmental concern and behaviours. Sociocentrism is expected to relate to greater environmental concern and behaviours than egocentrism. Environmental concern and behaviours are expected to more strongly related in ecocentrism than biocentrism, while more environmental concern is expected in biocentrism than sentiocentrism.

3.6.2. Heuristic Model Demonstrating Multiple Approaches to Environmental Concern

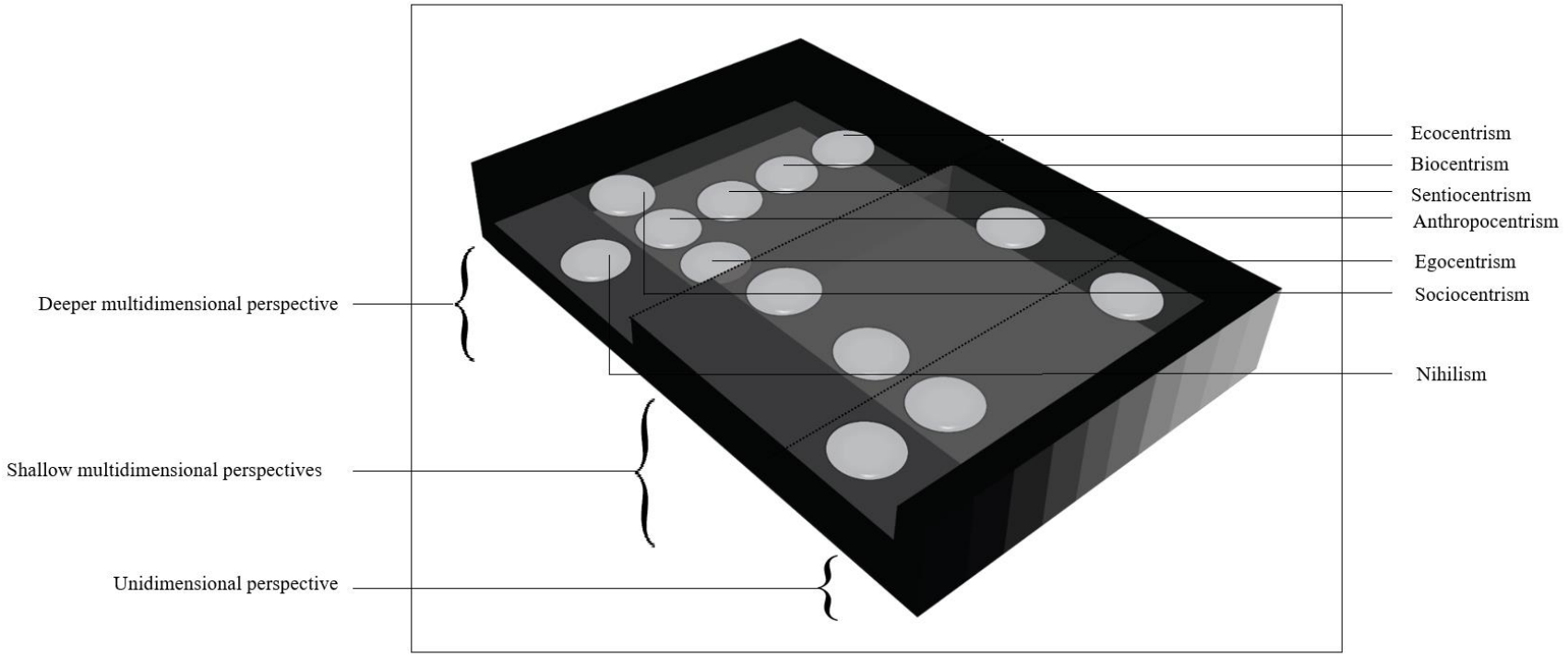

Figure 3. Heuristic model demonstrating multiple approaches to environmental concern.

This third heuristic model demonstrates a more comprehensive understanding of environmental concern, filling in gaps between the previous multidimensional approaches (Section 2.3). In order to save space, identical constructs to the first heuristic model are not relabelled.

This heuristic model is a combination of the first heuristic model presented at the end of the previous chapter (Section 2.5) and the theory map above (Subsection 3.6.1). The theory map, having been suggesting as providing a deeper understanding of environmental concern, is amended to the first heuristic model and is presented as a lower "slice" following the slice occupied by the previous multidimensional approaches. This is intended to portray the theory map and its constructs as providing a deeper perspective of environmental concern than constructs from the unidimensional and previous multidimensional assessments. Similarly to the previous multidimensional assessments presented in the first heuristic model, there are striking parallels between the theory map, the unidimensional assessments, and the multidimensional assessments. Since the theory map draws heavily from the multidimensional assessments, the parallels are unsurprising. However, unlike the multidimensional assessments, the theory map contains constructs which occupy each gap present between the multidimensional assessments. In relation to the unidimensional assessments, the parallels between them and the theory map are much the same as parallels discussed in Section 2.5 and between the unidimensional and multidimensional assessments, except the theory map fills the gaps between the multidimensional assessments and provides more nuanced categories for "nature". Appendices O & P contain colourized versions of this heuristic model.

Chapter 4 – Conceptual Framework

4.1. Introduction

The general argument of this project has alluded to great societal and personal change required in order to mitigate harmful effects of climate change. Noticing that humans are the primary cause of climate change, changing human behaviour to become more sustainable is critical. Radical new approaches and integration of different perspectives are necessary. The severity and complexity of climate change have been alluded to throughout this project. It is at this point where it is more thoroughly discussed and certain aspects of its severity are made explicit. Additionally, research into climate change is discussed as necessitating cross-disciplinary collaboration, thus drawing important information and perspectives from multiple disciplines and synthesizing that information to create areas of research and topics of inquiry which may aid in mitigating climate change. Presenting human behaviour as the root cause of climate change suggests that climate change may be viewed fundamentally as a moral problem hence, a better understanding of and research into people's moral beliefs and value systems is desirable and may provide an improved understanding of environmental concern and subsequently for developing intervention strategies. Experimental philosophy and empirical ethics are presented as guiding methodologies which provide grounding principles and theoretical backgrounds for the research of this project. Using methods normally associated with the social sciences, experimental philosophy is well positioned to frame empirical research from multiple areas of philosophy. Empirical ethics is an empirical research area relating to ethics, rather than all of philosophy. Empirical ethics provides important ways in which data on ethics can prove to be important. Meta-ethical fallacies explain that empirical findings may inform normative theories and their prescriptions, but may not be the sole basis on which moral claims are formed. The realism debate from the philosophy of science prescribes an anti-realist interpretation of the theory map. The underdetermination of scientific theories explains that there can never be enough evidence to thoroughly determine a theory, since that evidence would also provide support for other theories. The pessimistic meta-induction explains that the theory map may be viewed as an improvement on previous multidimensional assessments of environmental concern, but suggests that further improvements of environmental concern assessments are likely in the future.

4.2. Climate Change and Cross-Disciplinary Research

Climate change threatens to abruptly disrupt the status quo for virtually all life on Earth. Leichenko & Eisenhauer (2017) identify that loss of biodiversity, rapid human population growth, water and air pollution, land cover change, as well as several additional factors, all contribute to a worsening state of the Earth and the climate. Thompson expresses, '… climatologically we are in unfamiliar territory.' (2010, 153). 'Atmospheric concentrations of [Green House Gases (GHGs)] are at levels that are unprecedented in at least 800,000 years' (IPCC, 2014, 44). The IPCC (2014) express that, since 1750, CO2 has increased by 40%, Methane by 150%, and Nitrous oxide by 20%. 'Continued emission of greenhouse gases will cause further warming and long-lasting changes in all components of the climate system, increasing the likelihood of severe, pervasive and irreversible impacts for people and ecosystems' (IPCC, 2014, 8). CO2 has a very long residence time in the atmosphere (Archer & Brovkin, 2008). It is clear that the physical science basis is determined that GHGs are having a severe impact on the planet.

Climate change and the environmental crisis may readily be described as a moral problem – humans are consuming resources faster than they can be replenished and are making the Earth uninhabitable for themselves and other species. Grasso & Markowitz express that '… dozens of other scientists, philosophers, politicians, religious and spiritual leaders, artists, businesspersons and others have spoken forcefully—and from a wide diversity of perspectives— about the ethical and moral dimensions of climate change' (2015, 327). It is clear that approaching climate change is a complex task which requires integration and coordination between a wide range of academic disciplines, fields of research, and numerous additional stakeholders. Morillo, Bordons & Gómez claim that '… cross-disciplinary research is associated with creativity, progress, and innovation, and many of the intellectual "breakthroughs" of modern times were obtained by crossing disciplinary boundaries' (2003, 1237). Grasso & Markowitz express that '… scholars have begun to examine the "ethics of climate change" from a wide variety of disciplinary and multidisciplinary perspectives' (2015, 327). As the inadequacy of constructs used in the multidimensional assessments discussed in Chapter 2 suggests, not enough attention has been paid to describing ethical stances which human population buy into and that a greater integration between disciplines and approaches may contribute to advancing climate change mitigation strategies.

Fundamental to this project is noticing and arguing for an intuitive relationship between value extension and environmental concern, translating into an expected higher frequency of engagement in environmental behaviours as a greater set of entities are attributed with intrinsic value. This relationship is intuitive for several reasons. Primarily, it makes sense to believe that when some entities are valued intrinsically, the good of those entities is also taken into consideration and result in appropriate actions taken towards the good of those entities. To illustrate, contrasting intuitive actions and outcomes from sentiocentrism and ecocentrism with anthropocentrism sheds light onto the intuitive relationships between values and behaviours. When a sentiocentrist identifies some entity which can experience pain, and notices an entity of that sort in pain, it stands to reason that the sentiocentrist might take actions to prevent that entity experiencing further pain. This demonstrates why a sentiocentrism is considered to lead to at least some environmentally significant behaviours. An ecocentrist is a person who values the sound functioning of ecosystems and the relationships between entities which comprise ecosystems. It stands to reason that when an ecocentrist notices that an ecosystem is compromised, they are more likely than a non-ecocentrist to take actions to prevent further damage to the ecosystem. Noticing climate change as a phenomenon destructive to ecosystems, the intuitive relationship between ecocentrism and environmental behaviour becomes clear – environmental behaviour may be expected to reduce damage to ecosystems. Thus, an ecocentrist is intuitively expected to engage most frequently in numerous environmental behaviours and demonstrate high environmental concern. In contrast to an anthropocentrist, lower engagement with environmental behaviours and less environmental concern may be expected since they only place instrumental value on ecosystems and non-humans. Since the good of ecosystems themselves are not valued, harm and damage to ecosystems is easily justified, under anthropocentric approaches.

4.3. Guiding Methodologies

4.3.1. Experimental Philosophy

Experimental philosophy involves pursuing traditional questions of philosophy, but using tools of contemporary psychology (Knobe, Buckwalter, Nichols, Robbins, Sarkissian, & Sommers, 2012). The section above suggests that there are at least some reasons to believe that a greater extension of value translates into greater engagement with environmental behaviours. This claim is based on the intuitive relationships described above between beliefs and behaviours. Intuition and conceptual analyses are used often by philosophers in attempts to analyse and understand some complex concept such as knowledge, causation, or free will (Knobe *et al*., 2012). Experimental philosophy aids in categorizing several types of projects, such as this one. 'A guiding theme of the experimental philosophy movement is that it is not helpful to maintain a rigid separation between the disciplines of philosophy and psychology' (Knobe *et al*., 2012, 82). They continue by noting that several experimental philosophy papers are coauthored by psychologists and often appear in psychology journals. Subsequently, the disciplines do not always need to be considered discrete.

Noticing that 'Contemporary work in philosophy is shot through with appeals to intuition' (Knobe *et al*., 2012, 82), a persistent concern that the key claims from philosopher's intuitions is that they are not subject to empirical testing, resulting in those intuitions being '…insufficiently attentive to psychological theories about how people's minds actually work' (Stich 2001 in Knobe *et al*., 2012, 82). While philosophical intuition is a useful approach and remains influential in philosophy, '… it has inspired a growing ambivalence within the broader field of cognitive science' (Knobe *et al*., 2012, 82). It is desirable to have empirical aspects relating to the intuitions of philosophers. In addition to well analysed concepts, including empirical aspects allow for greater insights into concepts than would be possible on rational grounds alone. Empirical insights may be gained through verifying the existence of imagined concepts and constructs, similarly to the NEP scales discussed in Chapter 2. Perhaps more interestingly, empirical investigation may yield a spread of beliefs and opinion in groups or societies. This may indicate how closely different people or groups act in accordance with actions prescribed by some of the best theories in ethics. To illustrate, suppose it were found that people very seldom act to maximize utility. Since utilitarianism

prescribes acting to maximize utility, but finding that utility is generally not maximized, supports the objection claiming that utilitarianism is too demanding. It is too demanding because always acting to maximize utility would require a vast restricting of individual's daily habits and social norms. This demonstrates how facts can add strength to arguments involving ethics and moral deliberation.

4.3.2. Empirical Ethics

The study of ethics is often divided into three areas. The first division is between metaethics and normative ethics. Metaethics inquiries into questions such as '… whether there really is a difference between right and wrong …' (Sober, 2005, 384). Normative ethics assumes that there is really a difference between right and wrong and provides theories to prescribe which actions should be taken in different situations. The problem which normative ethics addresses is to determine what right and wrong might be. Applied ethics represents a third area of ethics. 'Applied ethics justifies its theories in terms of their rationality (rather than emotive strength, say), and from this they gain their binding force. These characteristics stem from bioethics' origin in moral philosophy, and the view that good moral practice … can be achieved by the application of pre-prepared ethical theories to specific situations – hence the 'applied ethics' model' (Hedgecoe, 2004, 124)

It is clear that environmental ethics does not fit neatly into any single one of these divisions. Since environmental ethics is inherently concerned with "Nature", meta ethical questions such as the value dispute described in the previous chapter (Section 3.2.2) are relevant, but environmental ethics theories, while often conflicted, do provide prescriptions for right action. Additionally, environmental ethics may be considered as an applied ethic, where our best theories in ethics are applied for considering the environment and in order to approaching climate change.

Empirical ethics represents a fourth area of ethical inquiry. Instead of viewing ethics as a purely rational enterprise, reserved for armchair philosophy, empirical ethics involves examining people's actual moral beliefs (De Vries & Gordijn, 2009). While environmental ethics can be classified into each of the initial three divisions in ethics, and does appear to have some latent

existence in all of the assessments discussed in Chapter 2, empirical assessments of environmental ethics appears to be an area which can undergo much development and may provide useful information for climate change mitigation.

De Vries & Gordijn (2009) identify six reasons how empirical ethics may contribute to, and improve our understanding of, ethics, and provide associated examples. These are summarized in the table below:

	Reason	Example	Source: (De Vries & Gordijn, 2009)
1	Aids in describing and analysing the actual moral conduct of persons or groups	'… determining whether policies or procedures designed to operationalize certain moral norms have been successful.'	(Sulmasy & Sugarman, 2001 in De Vries & Gordijn, 2009, 194)
2	Previously unrecognized moral issues may be identified	'… point out previously unrecognized ethical issues or the practical dilemmas of recognized ones that illuminate deficiencies in existing ethical theory.'	(Braddock, 1994 in De Vries & Gordijn, 2009, 194)
3	Helps to describe and analyse actual moral opinions and reasoning patterns of people involved in a certain practice	ethical recommendations must be sufficiently accepted by the people in a practice and should therefore be formulated in a way that stresses continuity with already accepted moral beliefs.'	(Birnbacher. 1999 in in De Vries & Gordijn, 2009, 195)
4	Improves normative theories by making them more context	'… consider its practical feasibility, its psychological acceptability and its potential effectiveness in changing the attitudes and behaviour in the desired direction.'	(Birnbacher. 1999 in in De Vries &

	sensitive and realistic		Gordijn, 2009, 195)
5	Describes facts relevant to normative arguments	'… normative theories may depend upon assumptions that can be empirically tested.'	(Sulmasy & Sugarman, 2001 in De Vries & Gordijn, 2009, 195).
6	Shows normative aspects of scientific theories or technologies'	For example, implementing an individualized, evidence-based decision into clinical practice, '… cannot be determined until the consequences … of the decision-making process are better known'	(Molewijk, 2006 in De Vries & Gordijn, 2009, 196)

Table 1. Six reasons demonstrating how empirical ethics may contribute to and improve our understanding of ethics.

All forms of Empirical Ethics have four common assumptions (Borry, Schotsmans & Dierickx, 2004 in De Vries & Gordijn, 2009):

:

a. People's actual moral beliefs are important in the ethical deliberation process
b. The methodology of the social sciences is useful for assessment
c. There is no structural incompatibility between empirical and normative approaches to ethics
d. Empirical Ethics is not an ethics methodology, but informs ethics.

Standing in opposition to traditional approaches to ethics, where moral deliberation and reasoning are the primary means of advancing ethics, these assumptions of empirical ethics provide an alternative means for obtaining ethical information. Related to several points above, the first assumption demonstrates that actual moral beliefs which people hold are important and should not be disregarded when formulating normative theories. Similarly to experimental philosophy, the second assumption permits empirical ethics making use of methods from the social sciences and notes that such methods are probably the best way to map reality. The third assumption demonstrates that empirical and normative ethics are not in conflict because of their vastly different

approaches, but may rather complement each other by adding factual weight to arguments or provide ground for their refutation. The fourth assumption merely points out that empirical ethics cannot inform as to what is right or wrong, nor explain whether right and wrong really exist or not, but it can demonstrate whether people believe that right or wrong exist, and what those beliefs about right and wrong are.

4.4. Meta-Ethical Considerations

Using experimental philosophy and empirical ethics appear well positioned as guiding methodologies for empirical research involving ethics. It is important to discuss three meta ethical fallacies which empirical research into ethics may be considered to commit. The three meta-ethical fallacies, are often cited as relevant criticisms of empirical ethics (Molewijk & Frith, 2009). 'By apparently deriving moral conclusions from factual premises, empirical ethics would disregard the is-ought gap, commit the naturalistic fallacy and/or violate the fact-value distinction' (De Vries & Gordijn, 2009, 193). While these fallacies are presented and discussed as distinct problems for empirical ethics, through understanding them, it becomes clear that each fallacy provides insight into effectively the same problem, that moral norms cannot be derived from facts of the world. Through ensuring that empirical ethics does not commit these meta ethical fallacies, insight is gained into the types of conclusions which can be derived from work in empirical ethics.

4.4.1. The Is-Ought Gap

The "Is-Ought Gap" was originally formulated in David Hume's *Treatise of Human Nature* published in 1740 (De Vries & Gordijn, 2009). 'Hume claimed that an ethical statement (describing what *ought* to be the case) can't validly be deduced from a set of premises that described only what *is* the case' (Sober, 2005, 391). This basically means that because things in the world happen to be a certain way, does not mean that those things should be the way which they are. 'Hume's point is sometimes characterised by saying that you can't infer an ethical conclusion from purely non-ethical premises' (Sober, 2005, 391). To illustrate briefly, it seems that there are sufficient reasons to accept "animalism", or basically '… is the view that we are animals' (Thornton, 2016, 515). Animalism is a factual view – it expresses something about the

world. Attempting to demonstrate that because humans are animals, sentiocentrism is true, is an example of a failure to make the Is-Ought gap. Sentiocentrism is the view that all beings which are sentient, or can experience pain are intrinsically valuable. Animalism fails to make any reference to humans or animals being intrinsically valuable. Thus, deriving intrinsic value for humans or animals or ascribing to sentiocentrism on a factual view such as animalism is fatally flawed. The is-ought gap can be avoided by including an additional premise to accompany the animalistic view. Including the justification that humans, and everything like humans, are intrinsically valuable, would permit deriving sentiocentrism as a conclusion. While this new premise is subject to validation and argumentation, it is valid to derive a sentiocentric view from those two premises. If empirical ethics were to derive normative conclusions from empirical findings alone, it would fail to make the is-ought gap.

4.4.2. The Naturalistic Fallacy

The naturalistic fallacy was made apparent in George Edward Moore's book *Principa Ethica* in 1903 (Sober, 2005). Similarly to Hume, Moore criticised the idea that '… ethical properties of an action-for example, its rightness or wrongness-might be identical with some "natural" property of that action' (Sober, 2005, 393). All forms of naturalism in ethics are at risk of committing the naturalistic fallacy (Parker, 2009). '…The Naturalistic fallacy basically involves the same problem as Hume's is-ought gap, that some fact of the world implies ethical treatment, is flawed. Just because something is "Natural", does not necessarily imply that it is intrinsically valuable or morally considerable. Additionally, the difficulty in defining "Nature" and "Natural" make this problem more severe. As the introductory chapter briefly discussed, defining the terms "Nature" and "Natural" is not an easy task. Recalling Mill's (Section 1.1) two paradoxical definitions of those terms, if moral conclusions were to be derived from something being "Natural", the result is two contradictory conclusions. Either everything could be considered to have a moral status, since the first definition of "Nature" considers literally everything to be "Natural", or only non-humans and those things not influenced by humans may have moral status, since the second definition of "Nature" defines it as anything not influenced by humans. Subsequently, appealing to "Nature" to derive moral status and consideration results in incommensurable contradictions.

4.4.3. The Fact-Value Distinction

The final form of the problem addressed by the fallacies is referred to as the fact-value distinction.' The phrase 'fact-value distinction' … refers not so much to problems or fallacies, but rather to certain meta-ethical views' (De Vries & Gordijn, 2009, 198). Rather than strictly being interpreted as a fallacy, the fact-value distinction may be considered as a meta-ethical view which takes facts to be separate from values. Arguably, facts are either true or false whereas values are taken as attributions. It is non-sensible to refer to values as true or false because they are not physical properties which can be identified through observation. Rather, values are attributed by a valuer, or someone who places value on certain facts, beliefs, or physical properties of the world. This has been discussed and is strongly related to the value dispute discussed in the previous chapter (Subsection 3.2.2). Value subjectivism presented values as mind-dependent subjective attributions and argued to be something which valuers place on facts, beliefs, or physical properties of the world. Considering values to be some sort of objective property of some given entities, was argued against. In contrast, it does appear to make sense to discuss physical properties of some entities as something which those entities possess. While not attempting to discuss metaphysical factors and essential qualities which may make entities what they are, it is worth mentioning that that factual statements are often presented as entities possessing certain qualities and that it is far less troubling than to express values as possessions in the same way. To briefly illustrate, taking any quadrupedal animal, it makes sense to speak of one such animal as *having* four legs. Those four legs are referred to as something *possessed* by the quadruped. It would not make sense, for example, if a biocentrist expressed value of quadrupeds in the same way as expressing that quadrupeds have four legs. Since the biocentrist is the one doing the valuing, it does not make sense to discuss value as a property of quadrupeds or any other existing entities or facts. This demonstrates that facts and values should be treated as distinct.

De Vries & Gordijn (2009) distinguish three features of the fact-value distinction. Firstly, 'No statement or concept is irreducibly both evaluative and factual.' (De Vries & Gordijn, 2009, 198). More semantic than ethical, this expresses that any given statement should only makes reference either to factual properties of some entity or to its moral status. Secondly, 'evaluative discourse fails to have certain characteristics (such as truth-aptness, objectivity, rationality, etc.) essential to

paradigmatic realistic discourses like, for example, scientific discourse' (De Vries & Gordijn, 2009, 198). This feature relates to the above discussion in that it does not make sense to discuss values as true or false. Since they are attributions, it can be true or false that an attribution is made, but not that any contents of the attribution itself are true or false. While attributions can be argued as being right or wrong however, this is not the same as expressing those attributions as being true or false. Thirdly, '(Scientific) facts do not presuppose values (or, alternatively, science is value-free)' (De Vries & Gordijn, 2009, 198). This feature merely justifies that facts do not presuppose values and that scientific facts are effectively value free. To briefly illustrate, science has produced several technological wonders. Atomic bombs are one such example. While science permits that such things can in fact be created, it is the duty of ethics to describe whether such things should be created. There is a distinction between what humans can do, and what it should do.

A resulting feature of these fallacies is that ethics research involving empiricism should not be interpreted as providing any prescriptions of right action, but rather that some results can play an important role in moral deliberations and have consequences for normative theories. To suppose that a study finds a clear majority of participants are ecocentric and then concluding that ecocentrism is the superior moral doctrine, is fallacious. While Ecocentrism may very be a superior moral doctrine, due to its emphasis on wholes and taking a great number of entities into account however, it is not a superior moral doctrine simply because it is widespread or accepted. The problem becomes clearer if another construct like Anthropocentrism is found to be the most prevalent construct. Should this be the case, it implies that the majority of participants consider humans to be superior to other entities, which may be impermissible given the threat of climate change and the role anthropocentrism is likely to have played in it. This effectively shows that although possessing data and other information on the prevalence of ethics is desirable, it cannot be the sole determinant of ethical discourse, but should rather compliment traditional philosophical and ethical discourse.

4.5. Considerations from the Philosophy of Science

4.5.1. The Realism Debate

The previous chapter described several value-orientated theories from environmental ethics and presented those theories on a theory map for easily referring to them and to clearly demonstrate extensions of value. It is important in this regard to discuss aspects of the theory map's representation as a contemporary model. Specifically, it is important to discuss the realism debate from the philosophy as science, since the theory map should have an anti-realist interpretation, being an ad hoc representation of specific facts of the world and not seeking to be an objective representation of any facts. Understanding this is made more complex considering the section above which demonstrates facts and values as distinct. Since the theory map is a model and representation of values and not facts, it is important to note that the map and subsequent study seek to demonstrate a spread of values in a population, rather than demonstrate prescriptions or a preferable moral theory. Since climate change required greater engagement of environmental behaviours, the preferred moral theory is that which is most related to environmental behaviour. As discussed in the section above relating to experimental philosophy (Section 4.3.1), it seems that there are some reasons to believe that ecocentrism and non-egalitarian strong-forms are related to increased frequencies of environmental behaviours. This is an intuition to be tested, but the heuristic models and their constituent constructs should first be identified as anti-realist interpretations of environmental concern.

George Box famously claimed that 'All models are wrong; some models are useful' (Box, Hunter & Hunter, 2005, 440). '… scientific realism is the view that we should believe in the unobservable objects postulated by our best scientific theories' (Ladyman, 2002, 129). In relation to Box's statement, scientific realism suggests that the way science and models depict the world, is how the world really is. 'Realists argue that the truth or approximate truth of a hypothesis is a necessary condition for it to be part of a genuine scientific explanation' (Ladyman, 2002, 196). '… antirealism is any view that denies that we know that even our best scientific theories refer to mind-independent unobservable entities' (Ladyman, 2002, 264). While acknowledging that science is the contemporary and a very successful means of rational inquiry, anti-realists recognize that limits

should be placed on the extent of scientific knowledge (Ladyman, 2002). In relation to Box's statement, a model is not required to be realistic in order to describe or explain some phenomenon. To better illustrate the debate, supposing that atoms are entities postulated to exist by some of the best scientific theories, a realist would express that atoms really do exist and are the way science describes them to be. An anti-realist might express that atoms are nothing more than constructs created by mere humans to describe the world and explain why the world is how it is.

These definitions and discussions may suggest that the realism debate is limited only to metaphysical aspects of science however, the fundamental features of both positions can be extended to representations of theoretical entities. Rather than discussing the theoretical entities themselves, since they are often strictly unobservable (Ladyman, 2002), it is not without difficulty to adequately describe those entities. Since they cannot be directly referred to or pointed out, a representation of those entities must be made so that they can be understood. While there are numerous different ways to refer to some theoretical entities, one way is by depicting them as pictures and diagrams. In relation to atoms, they are often depicted with a similar appearance to the solar system, with an electron orbiting a collection of protons and neutrons however, such a representation has limitations. Primarily, it is the wrong size. Atoms are far smaller than any depiction could represent them as, especially since science predicts the representation itself would necessarily be made of atoms. Furthermore, since atoms are unobservable, it is fundamentally impossible to view them in themselves and any depiction of their appearances cannot be a true depiction. This might be solved by providing a scale of measurement next to the atom's representation. However, the scale of atoms is too small for the human mind to readily conceive, thus the representation still fails to adequately represent the scale of atoms.

At this point, the realism debate is less about whether theoretical entities exist or not. Rather the debate is concerned with the extent to which theoretical entities are adequately represented, understood, and utilized. Contrasting the atom example with the heuristic models, while it is clear that the unobservables in the heuristic models are fundamentally different from atoms – atoms are the building blocks of reality while values are inventions of the human mind – they both offer representations of some phenomenon or aspects of the world. Both models are fundamentally wrong, thus an anti-realist interpretation of them is preferred. Adopting a realist position, in

relation to representation of unobservable, is likely to lead to disappointment as science progresses and improved representation are illustrated. Rather, how well the models aid in understanding phenomena, and how well they can be utilized, should be focused on. The two following subsections discuss two factors which lend strength to an anti-realist interpretation of the theory map.

4.5.2. Underdetermination of Theories

Basically, the underdetermination of scientific theories implies that any evidence supporting a theory, also supports infinitely many other theories (Ladyman, 2002). Effectively, '… any theory can be maintained in the face of any evidence, provided we make sufficiently radical adjustments elsewhere in our beliefs …' (Ariew, 1984, 313). Subsequently, it is impossible to completely determine any single theory without also determining other theories.

To illustrate in relation to some of the previous studies discussed in Chapter 2, Thompson & Barton's (1994) study provides some evidence for their constructs and associated relationships in their study. While the survey evidence which they have gathered does support their ecocentrism and anthropocentrism having certain distinctions, that very evidence may also be used to support another theory. For example, recalling that Stern *et al.*'s (1993) study used a construct referred to as the biospheric value-orientation which is very similar to Thompson & Barton's (1994) ecocentric attitude. It may be expressed that evidence for either of those constructs is also evidence for the other. Consequently, evidence for either theory cannot determine it – the evidence underdetermines the theories. Indeed, the theory map in this project makes similar distinctions, but with further discrepancies in value attribution. Subsequently, it is not impossible to portray the observations and evidence from both studies as supporting the constructs and relations in this study, as well as infinitely many other theories and approaches.

Basically, the underdetermination of theories shows that a model or theory should not be assumed to be true only because it has supporting evidence. In relation to the previous studies, and the theory map in this project, none can be determined in their entirely, lending support to an anti-realist interpretation of previous assessments and the theory map.

4.5.3. The Pessimistic Meta-Induction

Similarly to underdetermination, the pessimistic meta-induction demonstrates that scientific theories and models should not be realistically interpreted, but for a different reason. While appearing over-simplistic, the pessimistic meta-induction is 'Perhaps the most compelling argument against scientific realism …' (Ladyman, 2002, 230). The pessimistic meta-induction suggests that there is no good reason to believe that current scientific theories accurately describing the world. Current scientific theories typically replace prior theories in virtue of providing either simpler or superior explanations for some phenomenon. Since all theories preceding current ones have been shown to be false, there is little reason to suspect that current theories will not be replaced in the future (Ladyman, 2002). Since science progresses by disproving previous theories and replacing them with better corroborated theories, as falsificationism suggests (see Ladyman, 2002), it is not unexpected that at least some highly corroborated scientific theories will eventually be found to have flaws, and subsequently be adapted to new evidence or replaced all together.

In relation to this project, the theory map is intended to be used as a basis for an expanded multidimensional assessment of environmental concern. Subsection 2.3.3 argued that the common narrative used by Stern *et al.*'s (1993) cannot provide a nuanced enough approach for approaching climate change. Additionally, clear conceptions of constructs are desirable. The constructs depicted in the theory map are intended to serve as a basis for an expanded multidimensional assessment. While this may represent an improvement for multidimensional assessment, an anti-realist interpretation should be maintained. There is little reason to believe that, in the future, a better model may be developed which significantly improves on previous multidimensional assessments and the theory map. Perhaps a new understanding of environmental concern could do away with the unidimensional-multidimensional division of environmental concern and offer superior ways to facilitate environmental behaviours and approach climate change.

Chapter 5 – Methods

5.1. Introduction

The purpose of this chapter is to provide methods to answer the *research question*: Is environmental behaviour related to environmental concern? This chapter provides methods for assessing whether environmental behaviour is related to environmental concern. Environmental behaviour is assessed with a scale borrowed from Casey & Scott (2006). Environmental concern is assessed in two ways. First, with the revised NEP scale (Dunlap *et al*. 2000), which treats environmental concern as a unidimensional concept, indicating high to low concern. Second, with six 10-item original scales which treat environmental concern as a multidimensional concept, and are intended to relate to the constructs presented and described in the theory map towards the end of chapter 3 (Section 3.6.1). The following section describes the research design of this project and describes the study of this project as a quantitative, descriptive, cross-sectional non-experiment. Section 5.3. describes and justifies the sample selection. of first-year Life Science and first-year Economics students as appropriate subjects for comparisons. Section 5.4 discussed the design of the survey and the presentation of its four sections. Section 5.5. discusses hypotheses and analyses between sociodemographic variables, the established scales, and the original subscales. Section 5.6 presents the procedure used for gathering data and securing research ethics. Section 5.7 discusses aspects relating to the reliability and validity of the study.

5.2. Research Design

Johnson (2001) provides a classification of non-experimental research. It involves two elements: first, a primary research objective (descriptive, prediction, or explanation) and second, a temporal constraint (cross-sectional, longitudinal, or retrospective). This classification leads to identifying this research as a quantitative, descriptive, cross-sectional non-experiment.

It is quantitative in that the same survey was issued to all potential respondents, resulting in a lot of the same data being collected. Johnson (2001) suggests that the primary research objective can be determined by answering two questions. Were the researchers (a) '… primarily describing the

phenomenon?' and (b) '… documenting the characteristics of the phenomenon?' (Johnson, 2001, 9) Since this research seeks to describe the presence and spread of value traits and documents differences between samples, as well as no manipulation of variables '… the term descriptive nonexperimental research should be applied' (Johnson, 2001, 9). Mann identifies that cross-sectional studies are useful to '… determine prevalence and are useful at identifying associations …' (2003, 57). Mann continues by expressing that 'The most important problem with this type of study is differentiating cause and effect from simple association' (2003, 57). Since the survey was administered and data was collected within the timeframe of one month, this research is cross-sectional.

5.3. Sample Selection

Two convenient samples are selected for this study. They are first-year Economics students and first-year Life Science students from the University of the Witwatersrand. It is hypothesised that Life Science students will generally exhibit greater concern for the environment than Economics students. Consequently, if this hypothesis is corroborated, these samples should be sufficient for utilizing the theory map and its constructs. This hypothesis is based on the assumptions that Life Science students are more likely to have chosen to study Life Science because they generally value "nature" and natural entities more than their Economics counterparts, who are assumed to be more likely to have a stronger focus on generating money and accumulating wealth.

An additional consideration influencing the choice of samples relates to the cost of research. Mullinix, Leeper, Druckman & Freese (2015) discuss cost as a central challenge for surveys assessing representative populations. 'It is for this reason that many researchers continue to rely on cheaper convenience samples including those drawn from undergraduate students' (Mullinix *et al*., 2015, 110). In general, running a survey on '… convenience samples are substantially cheaper than a population-based sample…' (Mullinix *et al*., 2015, 110). While it would be desirable to have more data to analyse and to administer the survey to several more groups than Life Science and Economics students, in order to identify discrepancies between more groups, it is beyond the scope and affordability of this project. Subsequently, only Life Science and Economics samples are selected.

5.4. Research Question and Hypotheses

The main *research question* of this project is:
"Is there a significant relationship between environmental behaviour and environmental concern?"

This section details the aims and hypotheses relevant to this project. Casey & Scott (2006) have suggested that research on environmental concern has focused on two areas. The first area typically seeks to uncover relationships between sociodemographic variables and environmental concern while the second area observes relationships between environmental concern and environmentally friendly behaviour. The hypotheses described below, conform to the two areas identified by Casey & Scott (2006)

5.4.1. Hypotheses Concerning Environmental Behaviour and Environmental Concern

As discussed throughout this project, there is a challenge in determining how environmental concern should be assessed. Environmental behaviour might have some varying means of assessment, but it is by-and-large easier to determine how environmental behaviour should be assessed than environmental concern – behaviours are observable, quantifiable, and can readily be treated as a unidimensional scale, but it is less clear what environmental concern is. It is not something which can be directly observed, nor is it clear that quantifying it is sufficient. To resolve this challenge, environmental concern is treated in two ways. First, as a unidimensional concept, treating concern for the environment as ranging from high concern to low concern. This is assessed with the revised NEP scale (Dunlap *et al*. 2000). Second, as a multidimensional concept, treating concern for the environment as having underlying dimensions. This is assessed with original scales and items relating to the constructs nihilism, egocentrism, sociocentrism, sentiocentrism, biocentrism, and ecocentrism, presented in the theory map (Subsection 3.6.1). Environmental behaviour is assessed with Casey & Scott's (2006) environmental behaviour scale.

General null hypothesis: There is no significant relationship between environmental behaviour scale and environmental concern.

Regarding the environmental behaviour in relation to the revised NEP scale:
Null hypothesis: There is no significant relationship between the environmental behaviour scale with the revised NEP scale.
Alternative hypothesis: A moderate positive correlation between the environmental behaviour scale with revised NEP scale is expected.
Notes: Casey & Scott's (2006) results (Bivariate correlation $r = .45$).
Expectation: a moderate positive correlation, and rejection of the null.

Regarding the environmental behaviour and revised NEP scales, in relation to the six original scales:
Null hypothesis: There is no significant relationship between the environmental behaviour and revised NEP scales with any of the six original scales.
Alternative hypothesis 1: A strong negative correlation between the environmental behaviour and revised NEP scales with nihilism is expected.
Alternative hypothesis 2: A moderate negative correlation between the environmental behaviour and revised NEP scales with egocentrism is expected.
Alternative hypothesis 3: A moderate or strong positive correlation between the environmental behaviour and revised NEP scales with sociocentrism is expected.
Alternative hypothesis 4: A moderate positive correlation between the environmental behaviour and revised NEP scales with sentiocentrism is expected.
Alternative hypothesis 5: A moderate or strong positive correlation between the environmental behaviour and revised NEP scales with biocentrism is expected.
Alternative hypothesis 6: A strong positive correlation between the environmental behaviour and revised NEP scales with ecocentrism is expected.
Expectations: validating all alternatives and rejection of the null.

5.4.2. Hypotheses Concerning Sociodemographics and the Various Constructs

Additional *research questions* and hypotheses in this project involve sociodemographic items as predictor variables and general population trends as hypotheses, in relation to environmental behaviour and environmental concern.

In relation to gender:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with gender.
Alternative hypothesis: Gender is a significant predictor of environmental behaviour and environmental concern.
Notes: Similarly to Casey & Scott's (2006) results (environmental behaviour scale p = .001; revised NEP scale p = .003), gender is expected to be a significant predictor, with females higher than males in both.
Expectation: rejection of the null.

In relation to ethnicity:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with ethnicity.
Alternative hypothesis: Ethnicity is a significant predictor of environmental behaviour and environmental concern.
Expectation: No significant relationships are expected, failure to reject the null.

In relation to political identification:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with political identification.
Alternative hypothesis: Political identification is a significant predictor of environmental behaviour and environmental concern.
Expectation: No significant relationships are expected, failure to reject the null.

In relation to home language:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with home language.
Alternative hypothesis: Home language is a significant predictor of environmental behaviour and environmental concern.
Expectation: No significant relationships are expected, failure to reject the null.

In relation to household size:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with household size.
Alternative hypothesis: Household size is a significant predictor of environmental behaviour and environmental concern.
Expectation: There is some reason to suspect the null may be rejected. It is intuitive that a larger household entails less time available to commit to environmental behaviours and environmental concern. Consequently, it is expected that smaller household sizes maybe significantly related to greater environmental behaviour and environmental concern.

In relation to household income:
Null hypothesis: There is no significant relationship between environmental behaviour and revised NEP scales with household income.
Alternative hypothesis: Household income is a significant predictor of environmental behaviour and environmental concern.
Expectation: There is some reason to suspect the null may be rejected. It is intuitive that larger incomes entail more time available to commit to environmental behaviours and environmental concern. Consequently, it is expected that larger household incomes maybe significantly related to greater environmental behaviour and environmental concern.

An additional *research question* and hypothesis relates to the use of two samples in this study:
"Is environmental concern or behaviour significantly different between Life Science and Economics students?"

Null hypothesis: There is no significant difference in environmental concern or behaviour in Life Science and Economics students.
Alternative hypothesis: Presence of significant differences in environmental concern and behaviour between Life Science and Economics students.
Expectation: Life science students are expected to engage in significantly more environmental behaviours and demonstrate greater environmental concern than their Economics counterparts.

5.5. Survey Design

'Survey research is a non-experimental research approach used to gather information about the incidence and distribution of, and the relationships that exist between, variables in a pre-determined population' (Coughlan, Cronin & Ryan, 2009, 9). Consequently, a survey has been selected as an appropriate instrument for this study. As previously discussed, the environmental behaviour scale (EB) is borrowed from Casey & Scott (2006) and the revised NEP scale (NEP) is borrowed from Dunlap *et al*. (2000). This section discusses the placement of these scales in the survey, selection of sociodemographic items, and writing items and selection of content for the six original scales, Nihilism (NIH), Egocentrism (EGO), Sociocentrism (SOC), Sentiocentrism (SEN), Biocentrism (BIO), and Ecocentrism (ECO). For ease of access, the four sections are discussed in the order in which they appear in the survey.

5.5.1. Sociodemographic Items

The first section of the survey consisted of 11 items in total, including an item indicating that the respondent read a research information sheet and provides informed consent for their responses to be used in this project's analysis. The remaining 10 items inquire into the following sociodemographic information:

Item number	Sociodemographic information	Response categories
1	Consent	Yes / No
2	University	Wits
3	Current degree	BSc / BCom / BSc / BA / Other
4	Subject registered for	Introductory Life Science / Economics / Other
5	South African citizen	Yes / No
6	Gender	Male / Female / Other / Prefer not to say
7	Ethnicity	African / Caucasian / Indian / Asian / Mixed / Other / Prefer not to say
8	Political Identification	ANC / DA / EFF / Other / Prefer not to say
9	Home language	Zulu / Xhosa / English / Afrikaans / Other local language / Other foreign language / Prefer not to say
10	Household size	1 / 2 / 3 / 4 / 5 / 6 or more / Prefer not to say
11	Household income per month	less than R5000 / R5000-R10000 / R10000-R25000 / R25000-R50000 / R50000-R100000 / R100000 or more / Prefer not to say

Table 2. Survey's sociodemographic information and response categories.

5.5.2. Environmental Behaviour and Revised NEP Scale

The second and third sections of the survey consists of Casey & Scott's (2006) environmental behaviour scale and Dunlap *et al*.'s (2000) revised NEP scale, respectively. The environmental behaviour scale consists of seventeen items. Each item consists of a statement regarding a behaviour which participants may perform. Response categories consist of four behaviour frequency responses, ranging "never", "sometimes", "often", and "always". The full scale is included in (Appendix A). The revised NEP scale consists of fifteen 5-point Likert items. Five response categories are present, ranging from "strongly disagree", "disagree", "neutral", "agree", "strongly agree". The full scale is included in (Appendix B) Even-numbered items in the revised NEP scale indicate anti-NEP responses. Disagreement with these items indicates a Pro-NEP response. Therefore, these items are coded in reverse.

5.5.3. Six Original Scales

The fourth and final section of the survey consists of the six original scales. Items on each scale were written with the intention of each item relating to one of the six constructs - Nihilism, Egocentrism, Sociocentrism, Sentiocentrism, Biocentrism, and Ecocentrism – present on the theory map towards the end of chapter 3 (Subsection 3.6.1). Items were phrased only so that agreement indicates positive score on the scales Each subscale consists of fifteen 5-point Likert items, resulting in a total of 60 items. Five response categories are present, ranging from "strongly disagree", "disagree", "neutral", "agree", "strongly agree".

Items relating to nihilism essentially relate to a lack of care or indifference towards environmental and moral issues. Items relating to egocentrism essentially relate to self-interest, improving one's personal position, and lack of care for things which do not directly impact the person. Items relating to sociocentrism essentially relate to concern for humans presently alive and concern for future generations. Sentiocentrism items essentially relate to pain aversion in animals and affirming conscious animals as valuable. Biocentrism items essentially relate to valuing all plants and animals, and recognizing that it is bad for living things to be harmed. Ecocentrism items essentially relate to recognition of individual organisms contributing to a greater whole as well as valuing ecological processes and functions. Examples of items from each scale appear in the table below, Appendices C - H contain the full item lists.

Scale	Item number	Example of item
Nihilism	NIH 1	It doesn't matter what happens in the future.
Nihilism	NIH 4	Ultimately, everything we do has no meaning.
Egocentrism	EGO 5	Natural areas should be protected so that I can enjoy them
Egocentrism	EGO 8	The best thing about renewable energy is that it can save me money.
Sociocentrism	SOC 1	It is important to protect the environment for future generations.
Sociocentrism	SOC 10	Human life is more important than anything else.

Sentiocentrism	SEN 1	We should stop testing cosmetic products on animals because it harms them.
Sentiocentrism	SEN 8	We should avoid being cruel to animals.
Biocentrism	BIO 4	It is important to grow and nurture plants, even if I can't use them for anything specific.
Biocentrism	BIO 10	I respect everything which is alive, just because it is alive.
Ecocentrism	ECO	We should protect landscapes and local areas, as well as any plants and animals which live there.
Ecocentrism	ECO 6	I become upset when a natural area is cleared for buildings or construction.

Table 3. Examples of items designed to relate to constructs on the theory map.

5.6. Procedure for Data Collection and Research Ethics

In summary, the survey consists of 11 sociodemographic items, 17 environmental behaviour items (EB 1 - 17), 15 revised NEP items (NEP 1 – 15), and 60 original items (NIH 1 – 10; EGO 1 – 10; SOC 1 – 10; SEN 1 – 10; BIO 1 – 10; ECO 1 – 10), resulting in a total item count, for the entire survey, of 103 items. An electronic version of the survey was made and administered on SurveyMonkey. The survey was titled "MSc. Environmental Survey". The survey was distributed via email to first-year Introductory Life Science and first year Economics Theory students. The email displayed the participant information sheet (Appendix F) and had a consent item, where a "Yes" response was required before the link the survey would activate. A participant indicating consent provides permission for their responses to be used and included in analyses of this project. The version of the survey which was distributed to potential respondents randomized the order which scale's items appeared in the survey, i.e. excluding sociodemographic items, the order of environmental behaviour items were randomized, then the order of revised NEP scale items were randomized, then the 60 original scale's items were randomized. This is intended to reduce the order effect in the survey. Appendices I – L display the electronic version of the survey made on SurveyMonkey, without the items randomized.

In relation to research ethics, first, the Wits Faculty of Science approved the project (Appendix R). An ethics clearance certificate (Appendix Q) was obtained from an *ad hoc* social sciences research committee. Several documents and permission letters had to be obtained and submitted to secure ethics clearance. The following documents were submitted: The School of Social Science's Ethics Application Form, the Research Proposal, a Microsoft Word version of the Research Survey, the Participant Information Sheet (Appendix V), Letters of Permission from: The Deputy Registrar of Wits University (Appendix S), and two representative Professors for the Introductory Life Science and Introductory Economics courses (Appendix T & Appendix U).

For a brief overview, the Participant Information Sheet invited students from the two courses to participate by responding to the survey. Students were told that the survey was being administered to other first-year students like them and that they may withdraw their consent at any time. They were informed that no personal identifying information would be recorded, ensuring full confidentiality and anonymity. Responses are only used for analysis and no responses or analyses will impact students negatively in any way. Both my name and my supervisor's name and our contact details appear at the bottom of the Participant Information Sheet.

Once all the required documents had been gathered from relevant parties, and the ethics application had been approved, first-year Life Science and Economics Student's institutional email addresses were requested from staff members with the administrative authority to issue those email addresses. An electronic copy of the research instrument was made on and administered through SurveyMonkey during the month of September 2017. Students received that survey through SurveyMonkey's email option and were sent three periodic reminder emails, which increased the number of respondents.

Chapter 6 – Analysis

6.1. Introduction

196 students indicated "yes" to the informed consent item embedded in the email containing the link to the survey. After providing informed consent, several students failed to respond to any further items in the survey, and several more respondents failed to complete the entire survey. Of those initial 196 students who provided informed consent, 139 responded to the Sociodemographic items, 127 responded as far as the Behaviour scale, 117 responded as far as the NEP scale, and 98 respondents completed the entire survey.

The purpose of this chapter is to provide and discuss and analyse data gathered from the method described in the previous chapter. After analysing the data collected, findings are presented according to the objectives in a systematic manner and are well described with tables. The following section presents reliabilities of the various scales and provides a discussion of the various scales and their items. Suggestions for scale development are made for future studies wishing to utilize a similar model and approach as in this project. Section 6.3 analyses and discusses sociodemographic information, distribution of responses to the various scales. Section 6.4 discusses various relationships between variables. The first subsection provides relationships between sociodemographic items and the various scales. The second subsection provides and discusses relationships between the various scales. Section 6.5 provides a discussion of the analysis. This includes examining the hypotheses discussed in the previous chapter (Section 5.4) and identifying particular limitations of this study.

6.2 Reliability and Item Analysis

6.2.1. Cronbach's Alpha Values of the Various Scales

Reliability tests were conducted on all scales to test for internal reliability and consistency. The table below presents the individual scales' Cronbach's alpha values for the Environmental Behaviour scale (EB), the revised NEP scale (NEP), the Nihilism scale (NIH), the Egocentrism

scale (EGO), the Sociocentrism scale (SOC), the Sentiocentrism scale (SEN), the Biocentrism scale (BIO), and the Ecocentrism scale (ECO). The Cronbach Alpha scores for EB, NEP, NIH, EGO, SOC, SEN, BIO, ECO are 0.78, 0.76, 0.76, 0.74 and 0.81, respectively. SOC and SEN have below average Cronbach Alpha values while EGO has average Cronbach Alpha. The two columns on the right of the table below demonstrate potential improvements in the various scales' reliabilities, when certain items are removed. Analysing the content of these items and implications for the various scales is discussed below the table.

Number of respondents (n)	Scale	Cronbach alpha	Improved alpha	If items removed
127	EB	0.78	0.8	3; 12; 17
117	NEP	0.76	0.78	4; 6; 8; 14
98	NIH	0.76	0.76	10
98	EGO	0.52	0.6	6; 7; 10
98	SOC	0.42	0.76	1; 2; 3; 5; 9
98	SEN	0.36	0.64	3; 4; 5; 7; 10
98	BIO	0.74	0.78	5; 8; 9
98	ECO	0.82	0.82	N/A

Table 4. Cronbach's alpha values for the various tables.

It is evident that certain items from the EB scale may be removed to reduce the length of the scale, or modified to make the scale more contextually relevant. While removing some items may improve the Cronbach's alpha value of the revised NEP scale, this scale should be left intact. Studies wishing to use a lower total-item count may consider using the 6-item version of the NEP scale. While the NIH, BIO, and ECO scales are all sufficiently reliable, some items could have been phrased better and a lower item count is desirable. The EGO, SOC, and SEN scales all have low Cronbach's alpha values. Future studies wishing to use these or similar constructs should develop their own scales to assess the constructs.

6.2.2. Reliability of the Environmental Behaviour Scale

A small improvement in the Cronbach's alpha value (0.78 - 0.8) is possible. It is desirable to produce a more scale and identify item which do or do not relate to their relevant constructs.

Item EB 3 reads: “I avoid using aerosol sprays”.

This item may represent an area where respondents are less willing to compromise on their wants to favour the environment. However, it may be worthwhile to consider removing this item from the scale in further studies where a shorter scale is desired.

Item EB 12 reads: “When travelling short distances (Approx. 1 – 2 kilometres) I walk as opposed to driving or taking a bus”.

This item appears to have contextual factors which may not make it less applicable in South African contexts. South Africa’s public transport is not as well supported as in developing nations like Australia, where this scale was developed. Consequently, it may be worthwhile to consider removing this item from the scale in further studies in less developed nations.

Item EB 17 reads: “When available I half flush the toilet as opposed to full flush”.

This item is highly circumstantial and based on availability. It is unlikely that every toilet which respondents encounter has the option to half flush. Consequently, it may be worthwhile to consider removing this item from the scale in further studies, depending on whether respondents have access to, or are even familiar, with half-flushing toilets.

6.2.3. Reliability of the Revised NEP Scale

Regarding NEP, only a small improvement in the Cronbach’s alpha value (0.76 - 0.78) is possible. The NEP scale and revised NEP scale have undergone a lot of development, and a shorter 6-item version already exists. Consequently, no items should be removed from the revised NEP scale.

6.2.4. Reliability of the Nihilism Scale

Regarding NIH, only a very negligible increase in the Cronbach’s alpha value could be achieved.

Item NIH 10 reads: “We should not try to conserve resources”.

While this item does include elements of nihilism, producing a shorter scale is desirable. Removing this item would result in a 9-item scale and may be useful for a future study wishing to use a smaller item count than this study.

6.2.5. Reliability of the Egocentrism Scale

Regarding EGO, a small improvement in the Cronbach’s alpha value (0.52 – 0.6) is possible.

Item EGO 6 reads: “Laws and regulations concerning the environment limit my choices and freedom”.

Item EGO 7 reads: “I find it difficult to become concerned about environmental issues that don’t affect me”.

EGO 10 reads: “My friends might describe me as selfish”.

Removing these items only results in a small improvement in the alpha value. It is not clear that these items do not relate to the egocentrism construct. Further development of an egocentrism scale should be conducted before designing another survey.

6.2.6. Reliability of the Sociocentrism Scale

Regarding SOC, a big improvement in the Cronbach’s alpha value (0.42 - 0.76) is possible.

Item SOC 1 reads: “It is important to protect the environment for future generations”.

Item SOC 2 reads: “Securing a good future for children is very important”.

Item SOC 3 reads: “We should protect the environment so that all people can have a good future”.

Item SOC 5 reads: “It is important to always try and save other people’s lives”.

Item SOC 9 reads: “I worry that there will not be enough resources for future generations”.

While it is desirable to produce a more reliable scale and identify items which do or do not relate to the sociocentrism construct, it is evident that four of these SOC items relate to future generations, only with SOC 5 referring to people presently alive. This suggests that the sociocentrism construct may need to be reviewed and separated into two constructs relating to concern for people presently alive and concern for future generations.

6.2.7. Reliability of the Sentiocentrism Scale

Regarding SEN, a big improvement in the Cronbach’s alpha value (0.36 – 0.64) is possible.

Item SEN 3 reads: “Something’s capacity to feel pain determines how valuable it is”.

Item SEN 4 reads: “Gorillas and Chimpanzees are more important than other animals because they are more like humans”.

Item SEN 5 reads: “When something is conscious, it is more important than other things”.

Item SEN 7 reads: “It is ok to feed less developed creatures, like worms, to my pets which eat them, like birds”.

Item SEN 10 reads: “I am, or might become, a vegetarian because most farms do not treat animals ethically”.

While it is desirable to produce a more reliable scale and identify items which do or do not relate to the sentiocentrism construct, the original reliability of the SEN scale is very low. Even removing five items does not improve the alpha value to an acceptable level. It is evident that the items do

not clearly relate to their intended constructs. Consequently, future studies wishing to make use of a sentiocentrism scale should use different items and develop a new scale.

6.2.8. Reliability of the Biocentrism Scale

Regarding BIO, a weak improvement in the Cronbach's alpha value (0.74 – 0.78) is possible.

Item BIO 5 reads: "When I find pest animals in my home, I try to move them outside instead of killing them".

Item BIO 8 reads: "If I could, I would stop people from cutting down trees". This

Item BIO 9 reads: "Life is something which should be revered".

While it is desirable to produce a shorter scale and identify items which do or do not relate to the biocentrism construct, the reliability of this scale is sufficiently high. While items BIO 5, 8, and 9 do include elements of biocentrism, producing a shorter scale is desirable. Removing these items would result in a 7-item scale and may be useful for a future study wishing to use a smaller item count than this study.

6.2.9. Reliability of the Ecocentrism Scale

Regarding the ECO scale, no improvement in the already high reliability is possible. However, if items are utilized in further studies, it may be desirable to reduce the total number of items.

6.3. Descriptive statistics

6.3.1. Summary Sociodemographic Responses

Sociodemographic	Response category	n	%
Course	Economics	24	22.9 %
	Life Science	81	77.1 %
Gender	Male	49	35.3 %
	Female	89	64.0 %
	Prefer not to say	1	0.7 %
Ethnicity	African	89	64 %
	Asian	1	0.7 %
	Caucasian	23	16.5 %
	Indian	15	10.8 %
	Mixed	7	5.0 %
	Other	2	1.4 %
	Prefer not to say	2	1.4 %
Political party	ANC	21	15.1 %
	DA	30	21.6 %
	EFF	4	2.9 %
	Other	9	6.5 %
	Prefer not to say	75	54 %
Language	Afrikaans	4	2.9 %
	English	51	36.9 %
	Other foreign language	5	3.6 %
	Other local language	53	38.1 %
	Xhosa	8	5.8 %
	Zulu	17	12.2 %
	Prefer not to say	1	0.7 %
Household Size (number of people)	1	2	1%
	2	12	9%
	3	24	17%
	4	31	22%
	5	32	23%
	6 or more	36	26%
	Prefer not to say	2	1%
Household Income (per month)	Less than R5000	30	21.6 %
	R5000-R10000	10	7.2 %
	R10000-R25000	24	17.3 %
	R25000-R50000	17	12.2 %
	R50000-R100000	6	4.3 %
	More than R100000	6	4.3 %
	Prefer not to say	46	33.1 %

Table 5. Summary of responses to sociodemographic items.

From the total number of respondents in the study, 24 (22.9%) respondents were Economics students while 81 (77.1%) respondents were Life Science students. 34 respondents indicated that they studied a subject other than Life Science or Economics. Subsequently, they are not included in analyses involving the subject.

Most of the participants in the study were females. According to the data, there are 49 (35.3%) males who took part in the study, 1 (0.7%) respondent indicated that they would prefer not to say what their gender is, while 89 (64%) were females.

The majority of respondents are Africans, with a total of 89 (64%) respondents. 23 (16.5%) respondents are Caucasian, 15 (10.8%) are Indian, 7 (5%) indicated that their ethnicity is mixed, 2 (1.4%) indicated that they belong to other ethnicities, and 2 (1.4%) respondents preferred not to indicate their ethnicity. There was 1 (0.7%) Asian in the study, which was the least represented ethnic group.

In relation to politics, 21 (15.1%) respondents identified with the ANC, 30 (21.6%) respondents with the DA, 4 (2.9%) respondents with the EFF, 9 (6.5%) respondents identified with other political parties, and 75 (54%) respondents indicated that they would prefer not to say.

4 (2.9%) respondents indicated that their home language is Afrikaans, 51 (36.9%) respondents speak English, 8(5.8%) respondents speak Xhosa, 17 (12.2%) respondents speak Zulu, and 5 (3.6) respondents speak foreign languages. The majority of the respondents (53 respondents; 38.1%) speak other local languages. Only 1 respondent indicated that they would prefer not to say what their home language is.

The number of people in respondents' households were requested as well. 2 (1%) respondents indicated that they would prefer not to say and another 2 (1%) lived alone. 12 (9%) respondents lived with two people in their household, 24 (17%) lived with three people, 31 (22%) with four, 32 (23%) with five people, and 36 (26%) respondents indicated that they lived with six or more people in their household.

Household incomes of the respondents were recorded as well. 46 (33.1%) respondents indicated that they would prefer not to say what their household's income was. From the available data, 30 (21.6%) respondents' household income per month was less than R5000, 10 (7.2%) respondents' income was from R5000 to R10000, 24 (17.3%) respondents' income was from R10000 to R25000, 17 (12.2%) respondents' income was from R25000 to R50000. There were 6 (4.3%) respondents whose household income was from R50000 to R10000 and another 6 (4.3%) respondents whose income was R100000 or more.

6.3.2. Summary Frequencies of Environmental Behaviours

The table below presents distributions of environmental behavioural frequencies. A preliminary inspection of the data readily presents which behaviours are most and least engaged with. Those behaviours most engaged with may represent behavioural trends in the general population. Consequently, there is reason to believe that these behaviours require the least attention in programs seeking to increase the number of environmental behaviours in a target group. Those behaviours least engaged with may represent behavioural trends in the general population. Consequently, there is reason to believe that these behaviours require the most attention in programs seeking to increase environmental behaviours in a target group.

Item number	Response category										Mean	Standard Deviation
EB	Never		Sometimes		Often		Always		Total			
	#	%	#	%	#	%	#	%	n	%	μ	σ
1	21	17%	67	53%	25	20%	14	11%	127	100%	2.25	0.86
2	10	8%	15	12%	25	20%	77	61%	127	100%	3.33	0.97
3	26	20%	52	41%	22	17%	27	21%	127	100%	2.39	1.04
4	2	2%	21	17%	27	21%	77	61%	127	100%	3.41	0.82
5	12	9%	53	42%	34	27%	28	22%	127	100%	2.61	0.93
6	56	44%	30	24%	16	13%	25	20%	127	100%	2.08	1.17
7	15	12%	59	46%	34	27%	19	15%	127	100%	2.45	0.89
8	5	4%	13	10%	20	16%	89	70%	127	100%	3.52	0.83
9	12	9%	19	15%	40	31%	56	44%	127	100%	3.10	0.98
10	67	53%	39	31%	16	13%	5	4%	127	100%	1.68	0.84
11	3	2%	15	12%	28	22%	81	64%	127	100%	3.47	0.80
12	22	17%	30	24%	24	19%	51	40%	127	100%	2.82	1.14
13	1	1%	9	7%	21	17%	96	76%	127	100%	3.67	0.64
14	58	46%	33	26%	18	14%	18	14%	127	100%	1.97	1.08
15	17	13%	40	31%	35	28%	35	28%	127	100%	2.69	1.02
16	3	2%	16	13%	14	11%	94	74%	127	100%	3.57	0.80
17	35	28%	32	25%	32	25%	28	22%	127	100%	2.42	1.12

Table 6. Summary of frequencies of environmental behaviours.

*Highlighted cells represent those activities more frequently and less frequently engaged in. Dark green cells draw attention to particularly high frequencies of engaging in environmental behaviours. Light green cells draw attention to lower, but still high frequencies of engaging in an environmental behaviours. Yellow cells draw attention to moderate frequencies of engaging in an environmental behaviours. Light orange cells draw attention to low frequencies of engaging in an environmental behaviours. Dark orange cells draw attention to the lowest frequencies of engaging in an environmental behaviours.

The following items have the highest frequencies of performing environmental behaviours and may require the least attention in programs seeking to increase environmental behaviours in a target group:

Item 2 reads: “I re-use plastic shopping bags for future shopping and/or other purposes”.
Item 4 reads: “I turn the television off when it is not in use”.
Item 8 reads: “When inside, and if sufficient sun light is shining through the windows, I use sun light as opposed to artificial light”.
Item 9 reads: “I use the washing machine only when it has a full load”.
Item 11 reads: “When writing I use both sides of the paper”.
Item 13 reads: “When cleaning my teeth I turn the tap off rather than leaving it run”.
Item 16 reads: “I turn the stereo/radio off when it is not in use”.

Items 1, 3, 5, 6, 10, 14 have the lowest frequencies of performing environmental behaviours and may require the most attention in programs seeking to increase environmental behaviours in a target group:

Item 1 reads: “Where possible, I buy products made from recycled materials as opposed to those items not made from recycled materials”.
Item 3 reads: “I avoid using aerosol sprays”.
Item 5 reads: “I take short showers to limit water use”.
Item 6 reads: “I recycle newspapers”.
Item 10 reads: “I compost non-meat food scraps”.
Item 14 reads: “I recycle glass materials”.

Items 12 and 15 have moderate frequencies of performing environmental behaviours and may require less attention, depending on contextual factors, in programs seeking to increase environmental behaviours in a target group:

Item 12 reads: “When travelling short distances (Approx. 1 – 2 kilometres) I walk as opposed to driving or taking a bus”.

Item 15 reads: “When I buy a few items at the store I say no to plastic bags”.

Item 17 is the only item to have roughly the same distribution in each response category.
It reads: “When available I half flush the toilet as opposed to full flush”.

This can probably be attributed to contextual factors, where respondents are expected to have varying levels of availability and familiarity with toilets offering a half-flush option.

6.3.3. Summary of Pro-NEP Responses

Item number	Response category												Mean	Standard Deviation
NEP	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	4	3%	7	6%	27	23%	34	29%	45	38%	117	100%	3.93	1.08
2	5	4%	15	13%	37	32%	29	25%	31	26%	117	100%	3.56	1.14
3	2	2%	6	5%	18	15%	42	36%	49	42%	117	100%	4.11	0.96
4	7	6%	34	29%	50	43%	17	15%	9	8%	117	100%	2.89	0.99
5	4	3%	2	2%	9	8%	47	40%	55	47%	117	100%	4.26	0.93
6	32	27%	44	38%	25	21%	14	12%	2	2%	117	100%	2.23	1.04
7	5	4%	4	3%	20	17%	24	21%	64	55%	117	100%	4.18	1.10
8	25	21%	53	45%	24	21%	10	9%	5	4%	117	100%	2.29	1.03
9	3	3%	5	4%	15	13%	50	43%	44	38%	117	100%	4.09	0.95
10	1	1%	9	8%	23	20%	48	41%	36	31%	117	100%	3.93	0.94
11	4	3%	14	12%	27	23%	39	33%	33	28%	117	100%	3.71	1.11
12	16	14%	13	11%	31	26%	24	21%	33	28%	117	100%	3.38	1.36
13	4	3%	7	6%	24	21%	48	41%	34	29%	117	100%	3.86	1.02
14	8	7%	21	18%	39	33%	30	26%	19	16%	117	100%	3.26	1.14
15	1	1%	1	1%	16	14%	43	37%	56	48%	117	100%	4.30	0.80

Table 7. Summary of pro-NEP agreement responses.

*Even numbered items were coded in reverse, since disagreement with these items indicates a pro-NEP score.
** Highlighted cells represent particularly high and low levels of agreement and disagreement with various NEP ite ms. Dark green cells represent particularly high levels of agreement with revised NEP items. Light green cells repre sent lower, but still high levels of agreement with revised NEP items. Yellow cells represent high levels of a neutral response to revised NEP items. Light orange cells represent high levels of disagreement with revised NEP items. Da rk orange cells represent even higher levels of disagreement with revised NEP items.

As stated previously, the NEP scale and revised NEP scale have both undergone a lot of development and great effort to validate treating it as a unidimensional assessment of environmental concern. Consequently, it is recommended that future studies utilize all items in the scale.

The first note in the table above expresses that disagreement with even item numbered revised NEP items represent pro-NEP response. It is interesting to note that the NEP items 4, 6, and 8, despite being coded in reverse, have high levels of disagreement. This is counterintuitive because, despite being reverse coded, they suggest an anti-NEP response. After reverse coding even

numbered items, it is expected for all items to have high levels of agreement, indicating pro-NEP responses. Yet these three items have high levels of disagreement instead.

Item 4 reads: "Human ingenuity will insure that we do NOT make the earth unlivable".

Item 6 reads: "The earth has plenty of natural resources if we just learn how to develop them".

Item 8 reads: "The balance of nature is strong enough to cope with the impacts of modern industrial nations".

6.3.4. Summary of Agreement with Items in the Original Scales

6.3.4.1. Summary of Nihilism (NIH) Responses

Item number	Response category												Mean	Standard Deviation
NIH	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	65	66%	27	28%	5	5%	1	1%	0	0%	98	100%	1.41	0.64
2	76	78%	14	14%	5	5%	3	3%	0	0%	98	100%	1.34	0.72
3	76	78%	14	14%	5	5%	2	2%	1	1%	98	100%	1.35	0.76
4	44	45%	25	26%	18	18%	7	7%	4	4%	98	100%	2.00	1.14
5	34	35%	28	29%	29	30%	3	3%	4	4%	98	100%	2.13	1.06
6	68	69%	20	20%	6	6%	1	1%	3	3%	98	100%	1.48	0.90
7	58	59%	21	21%	15	15%	4	4%	0	0%	98	100%	1.64	0.89
8	69	70%	19	19%	7	7%	1	1%	2	2%	98	100%	1.45	0.84
9	46	47%	35	36%	14	14%	3	3%	0	0%	98	100%	1.73	0.82
10	63	64%	18	18%	7	7%	4	4%	6	6%	98	100%	1.69	1.16

Table 8. Summary of agreement with nihilism items.

* Highlighted cells represent high frequencies of disagreement with various NIH items. Dark green cells represent p articularly high frequencies of disagreement with NIH items. Light green cells represent lower, but still high freque ncies of disagreement with NIH items.

As expected, most respondents indicated general disagreement with NIH items. This was true for all items designed to assess the nihilism construct. This is unsurprising since all item were written

to portray a generally negative attitude towards the environment and "nature", which was expected to have high levels of disagreement.

Since this the Cronbach alpha value of this scale is known to be acceptable (0.76) (see Table 4), and since agreement is consistent across all items, the conclusion is that this scale does adequately assess nihilism. Further studies wishing to examine similar underlying constructs as this project, could use items from this scale, or alternatively attempt to write a shorter scale, adopt items from Thompson & Barton's (1994) apathy scale, or use a different instrument entirely.

6.3.4.2. Summary of Egocentrism (EGO) Responses

Item number	Response category												Mean	Standard Deviation
EGO	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	2	2%	4	4%	22	22%	24	24%	46	47%	98	100%	4.10	1.02
2	4	4%	7	7%	27	28%	33	34%	27	28%	98	100%	3.73	1.07
3	3	3%	8	8%	37	38%	33	34%	17	17%	98	100%	3.54	0.98
4	2	2%	6	6%	33	34%	30	31%	27	28%	98	100%	3.76	1.00
5	2	2%	6	6%	28	29%	28	29%	34	35%	98	100%	3.88	1.03
6	20	20%	37	38%	36	37%	5	5%	0	0%	98	100%	2.27	0.84
7	26	27%	40	41%	20	20%	9	9%	3	3%	98	100%	2.21	1.04
8	6	6%	17	17%	23	23%	28	29%	24	24%	98	100%	3.48	1.21
9	50	51%	34	35%	10	10%	3	3%	1	1%	98	100%	1.68	0.86
10	33	34%	41	42%	21	21%	1	1%	2	2%	98	100%	1.96	0.88

Table 9. Summary of agreement with egocentrism items.

* Highlighted cells represent varying levels of agreement and disagreement with items. Dark green and light cells re present particularly high frequencies of responses and generally appear consistent with pro-environmental perspectiv es.

Unexpectedly, two clear sets of responses emerge from the data. The first set of items, items 1, 2, 3, 4, 5, and 8, all indicate general agreement. The second set, items 6,7, 9, and 10, all indicate general disagreement.

Examining the item content of items 1, 2, 3, and 4, reveals content relating to self-interest. The item content of items 5, 6, 7, 8, 9, and 10 reveals more complex concepts in association with the self. For example, item 8 implicates potential monetary savings of renewable energy. This suggests that designing items to assess egocentrism should not involve more complex concepts and write content which clearly relates to the construct.

Since this the Cronbach alpha value of this scale is known to be low (0.52) (see Table 4), in addition to the content problem discussed above, the conclusion is that this scale does not adequately assess egocentrism and further studies wishing to examine similar underlying constructs as this project, should write new items or use a different instrument entirely to examine egocentrism.

6.3.4.3. Summary of Sociocentrism (SOC) Responses

Item number	Response category												Mean	Standard Deviation
SOC	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	0	0%	0	0%	9	9%	20	20%	69	70%	98	100%	4.61	0.65
2	0	0%	1	1%	10	10%	19	19%	68	69%	98	100%	4.57	0.72
3	0	0%	0	0%	12	12%	24	24%	62	63%	98	100%	4.51	0.71
4	33	34%	36	37%	20	20%	8	8%	1	1%	98	100%	2.06	0.98
5	35	36%	6	6%	10	10%	21	21%	26	27%	98	100%	2.97	1.67
6	39	40%	32	33%	18	18%	4	4%	5	5%	98	100%	2.02	1.10
7	20	20%	26	27%	33	34%	18	18%	1	1%	98	100%	2.53	1.05
8	42	43%	40	41%	7	7%	2	2%	7	7%	98	100%	1.90	1.11
9	2	2%	3	3%	9	9%	35	36%	49	50%	98	100%	4.29	0.91
10	30	31%	28	29%	24	24%	10	10%	6	6%	98	100%	2.33	1.19

Table 10. Summary of agreement with sociocentrism items.

* Highlighted cells represent varying levels of agreement and disagreement with items. Dark green and light cells re present particularly high frequencies of responses and generally appear consistent with pro-environmental perspectiv es. Yellow cells indicate a lower response frequency, but still high enough in a category of agreement to stand out.

Unexpectedly, two clear sets of responses emerge from the data. The first set of items, items 1, 2, 3, and 9, all indicate general agreement. The second set, items 4, 6, 7, 8, and 10, all indicate general

disagreement. Item 5 has a more bipolar distribution, with low levels of disagreement and neutrality.

Examining the item content of items 1, 2, 3, and 9, reveals content relating to future generations. Agreement with these items suggest a high concern for future generations. This is consistent with what is expected in the sociocentrism scale. The item content of items 4, 6, 7, 8, and 10 reveals content relating to people presently alive and present-day society. The high level of general disagreement with these items is surprising, considering that the previous set of items had much higher levels of agreement, instead of disagreement. A closer inspection of these items reveals that, while they all implicate benefits for other people or society, they also implicate damaging the environment. Unlike the previous set of items, the content of which does not implicate damaging the environment, the present of environmental damage suggests something resembling a poly- or multi- centric perspective (see Section 3.5.2). In this instance, such a perspective would demonstrate both concern for future generation and the environment.

Item 5 reads: “It is important to always try and save other people’s lives”. This item has a bipolar distribution and is not representative of either concept discussed here. It should not be included in further studies wishing to examine similar underlying constructs as this project, should write new items or use a different instrument to examine sociocentrism

Since this the Cronbach alpha value of this scale is known to be low (0.42) (see Table 4), in addition to the conflict of concern discussed above, the conclusion is that this scale does not adequately assess sociocentrism and further studies wishing to examine similar underlying constructs as this project, should attempt to commensurate varying levels of concern for future generations and people presently alive today. New items should be written, or use a different instrument entirely to examine sociocentrism.

6.3.4.4. Summary of Sentiocentrism (SEN) Responses

Item number	Response category												Mean	Standard Deviation
SEN	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	2	2%	5	5%	26	27%	26	27%	39	40%	98	100%	3.97	1.03
2	2	2%	4	4%	9	9%	20	20%	63	64%	98	100%	4.41	0.96
3	27	28%	23	23%	21	21%	19	19%	8	8%	98	100%	2.57	1.30
4	53	54%	32	33%	11	11%	1	1%	1	1%	98	100%	1.62	0.81
5	13	13%	25	26%	38	39%	19	19%	3	3%	98	100%	2.73	1.02
6	1	1%	2	2%	23	23%	43	44%	29	30%	98	100%	3.99	0.84
7	8	8%	17	17%	43	44%	26	27%	4	4%	98	100%	3.01	0.97
8	1	1%	1	1%	9	9%	20	20%	67	68%	98	100%	4.54	0.79
9	4	4%	13	13%	40	41%	18	18%	23	23%	98	100%	3.44	1.11
10	17	17%	24	24%	24	24%	18	18%	15	15%	98	100%	2.90	1.32

Table 11. Summary of agreement with sentiocentrism items.

* Highlighted cells represent varying levels of agreement and disagreement with items. Dark green and light cells re present particularly high frequencies of responses and generally appear consistent with pro-environmental perspectiv es. Yellow cells indicate a high response in the neutral category. Dark orange and orange cells indicate response freq uencies which appear to tend towards anti-environmental perspectives.

Unexpectedly, two clear sets of responses emerge from the data. The first set of items, items 1, 2, 6, and 8, all indicate general agreement. The second set, items 3, 4, and 5, all indicate general disagreement, particularly item 4.

Examining the item content of items 1, 2, 6, and 8, reveals content relating avoiding animal cruelty. Agreement with these items suggest the desire avoid or prevent harm to animals. The item content of items 3, 4, and 5 reveals more complex concepts, which respondents may have found difficult to understand or express agreement with. This suggests that designing items to assess sentiocentrism should not involve more complex concepts and write content which clearly relates to the construct.

Since this the Cronbach alpha value of this scale is known to be low (0.36) (see Table 4), in addition to the content problem discussed above, the conclusion is that this scale does not adequately assess sentiocentrism and further studies wishing to examine similar underlying constructs as this project, should write new items or use a different instrument entirely to examine sentiocentrism.

6.3.4.5. Summary of Biocentrism (BIO) Responses

Item number	Response category												Mean	Standard Deviation
BIO	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	1	1%	3	3%	8	8%	28	29%	58	59%	98	100%	4.42	0.85
2	0	0%	4	4%	22	22%	31	32%	41	42%	98	100%	4.11	0.90
3	2	2%	2	2%	12	12%	34	35%	48	49%	98	100%	4.27	0.90
4	1	1%	2	2%	14	14%	28	29%	53	54%	98	100%	4.33	0.87
5	12	12%	13	13%	29	30%	20	20%	24	24%	98	100%	3.32	1.31
6	1	1%	0	0%	6	6%	23	23%	68	69%	98	100%	4.60	0.70
7	2	2%	0	0%	6	6%	17	17%	73	74%	98	100%	4.62	0.78
8	2	2%	2	2%	19	19%	29	30%	46	47%	98	100%	4.17	0.95
9	1	1%	1	1%	32	33%	20	20%	44	45%	98	100%	4.07	0.96
10	1	1%	6	6%	25	26%	24	24%	42	43%	98	100%	4.02	1.02

Table 12. Summary of agreement with biocentrism items.

* Highlighted cells represent high frequencies of general agreement with various BIO items. Dark green cells represent particularly high frequencies of agreement with BIO items. Light green cells represent lower, but still high frequencies of agreement with BIO items.

As expected, most respondents indicated general agreement with BIO items. This was true for all items designed to assess the biocentrism construct, except item 5. This is unsurprising since all item were written to portray a generally positive attitude towards life and living things.

Item 5, however, represents a behavioural trait and should be omitted in future scales assessing biocentrism.

Since this the Cronbach alpha value of this scale is known to be acceptable (0.74) (see Table 4), and since agreement is consistent across all items, the conclusion is that this scale does adequately assess biocentrism. Further studies wishing to examine similar underlying constructs as this project, could use items from this scale, or alternatively attempt to write a shorter scale, or use a different instrument entirely.

6.3.4.6. Summary of Ecocentrism (ECO) Responses

Item number	Response category												Mean	Standard Deviation
ECO	Strongly Disagree		Disagree		Neutral		Agree		Strongly Agree		Total			
	#	%	#	%	#	%	#	%	#	%	n	%	μ	σ
1	0	0%	0	0%	9	9%	31	32%	58	59%	98	100%	4.50	0.66
2	1	1%	1	1%	4	4%	30	31%	62	63%	98	100%	4.54	0.72
3	1	1%	4	4%	17	17%	25	26%	51	52%	98	100%	4.23	0.95
4	0	0%	1	1%	13	13%	41	42%	43	44%	98	100%	4.29	0.73
5	1	1%	0	0%	13	13%	22	22%	62	63%	98	100%	4.47	0.80
6	1	1%	6	6%	27	28%	31	32%	33	34%	98	100%	3.91	0.97
7	1	1%	3	3%	13	13%	30	31%	51	52%	98	100%	4.30	0.89
8	2	2%	4	4%	15	15%	36	37%	41	42%	98	100%	4.12	0.96
9	1	1%	4	4%	9	9%	25	26%	59	60%	98	100%	4.40	0.89
10	1	1%	1	1%	37	38%	44	45%	15	15%	98	100%	3.72	0.77

Table 13. Summary of agreement with ecocentrism items.

* Highlighted cells represent high frequencies of general agreement with various ECO items. Dark green cells represent particularly high frequencies of agreement with ECO items. Light green cells represent lower, but still high frequencies of agreement with ECO items.

As expected, most respondents indicated generally agreement with ECO items. This was true for all items designed to assess the Ecocentrism construct. This is unsurprising since all item were written to portray a generally positive attitude towards ecosystems and their associated processes.

Since this the Cronbach alpha value of this scale is known to be acceptable (0.82) (see Table 4), and since agreement is consistent across all items, the conclusion is that this scale does adequately assess Ecocentrism. Further studies wishing to examine similar underlying constructs as this project, could use items from this scale, or alternatively attempt to write a shorter scale, adopt items from Thompson & Barton's (1994) ecocentric scale, or use a different instrument entirely.

6.4. Relationships between Variables

An independent sample T test and analysis of variance (ANOVA) were performed on the sociodemographics and the various scales, in order to determine the presence of relationships between the variables. The table below summarizes the means of the sociodemographic items and the various scales. The subsections which follow discuss the results of the T test and ANOVA

Variable		EB	NEP	NIH	EGO	SOC	SEN	BIO	ECO
Course	Economics	45.14	56.70	17.38	30.44	30.44	32.88	40.25	41.44
	Life sciences	48.51	55.56	15.47	30.28	32.16	33.39	42.86	43.81
Gender	Male	46.20	55.64	17.20	31.83	31.66	32.14	40.97	41.14
	Female	48.07	55.41	15.68	29.94	31.86	33.76	42.46	43.22
Ethnicity	African	46.80	53.39	16.29	31.69	32.36	32.51	41.64	41.75
	Asian	42.00	54.00	29.00	25.00	26.00	36.00	35.00	32.00
	Caucasian	48.57	59.95	15.70	28.40	31.00	34.30	41.85	44.45
	Indian	48.50	59.08	17.67	30.25	31.17	34.00	42.42	42.25
	Mixed	49.50	55.50	12.40	28.60	31.40	34.00	45.40	45.40
	Other	46.00	57.00	12.00	31.00	29.00	34.00	44.00	45.00
Political party	ANC	50.32	53.72	15.54	30.46	33.38	34.77	44.38	42.46
	DA	47.90	58.25	15.73	30.55	32.09	33.55	41.32	43.91
	EFF	45.00	56.25	15.33	29.67	29.00	31.33	39.00	39.67
	Other	47.71	63.40	14.20	25.00	25.00	33.40	45.60	47.00
Language	Afrikaans	47.25	60.00	15.75	29.00	31.25	33.00	42.50	44.75
	English	49.71	59.59	15.85	29.10	30.38	34.36	43.10	44.21
	Other foreign language	44.60	54.20	17.20	29.40	32.80	33.20	38.40	40.60
	Other local language	45.70	52.70	16.66	32.34	32.84	32.11	40.92	40.76
	Xhosa	48.88	51.33	14.80	33.60	35.00	35.40	44.40	43.20
	Zulu	46.14	51.33	16.57	29.29	31.14	31.00	41.29	41.71
Household Income (per month)	Less than R5000	48.61	53.96	16.81	31.76	31.57	32.71	42.76	42.71
	R5000-R10000	48.00	55.17	12.80	32.40	31.40	34.40	46.20	45.40
	R10000-R25000	43.82	52.75	17.21	32.32	32.95	33.16	40.26	41.84
	R25000-R50000	47.94	57.73	15.69	28.15	30.92	32.54	41.69	42.92
	R50000-R100000	53.60	58.20	12.25	29.75	31.50	35.25	43.75	45.00

	More than R100000	52.17	61.20	14.50	29.50	33.50	30.25	44.00	44.25
Household Size (number of people)	1	54.5	66.5	13.5	25.5	28	37.5	47.5	48
	2	48	55.82	15.89	30.34	30.78	34.45	43.78	43.78
	3	49.3	52.84	14.45	31.12	32.45	31.67	41.45	40.67
	4	47.53	54.81	16.4	29.8	31.12	33.24	40.2	42.16
	5	48	53.76	17.22	29.7	31.35	33.17	42.7	43
	6 or more	45.85	53.09	16.35	31.85	33.04	33.42	42.23	42.08

Table 14. Means of the sociodemographic items and the various scales.

6.4.1. Sociodemographic Relationships

6.4.1.1. Relationship Concerning Life Science and Economics Samples

The results show that there was a significant difference (p-value=0.04) between Economic and Life science participants for EB. There was no statistically significant difference between economic and life science participants for NEP, NIH, EGO, SOC, SEN, BIO and ECO.

6.4.1.2. Relationships Concerning Gender

The results show that there was no significance mean difference (p-value>0.05) between gender across all the constructs except EGO and SEN.

6.4.1.3. Relationships Concerning Ethnicity

In comparing the mean scores of all the constructs by ethnicity, a significant mean difference was observed for NEP, NIH and EGO. The results revealed that the mean NEP among the ethnic groups African (mean=53.39), Asian (mean=54.00), Caucasian (mean=59.95), Indian (mean=59.08), mixed (mean=55.50) and other (mean=57.00) differ significantly (F-value=3.719, p-value=0.00378). The result of a Tukey test revealed that there was significant difference between Africans and Caucasian (p-value=0.003).

Similarly, the result showed the mean NIH among the ethnic groups African (16.29), Asian (mean=29.00), Caucasian=15.70), Indian (mean=17.67), mixed (mean=12.40), other (mean=12.00) differ significantly (F-value=2.34, p-value=0.04). A post hoc test revealed that there

was a significant difference between Asian and Mixed (p-value=0.03) regarding NIH. There were no statistically significant differences between the other ethnic categories.

There was a statistically significant difference among the EGO mean values for the different ethnic groups (F-value=2.516, p-value=0.035). The mean EGO value for Africans was 31.69, it was 25.00 for Asians, 28.40 for Caucasians, 30.25 for Indian, 28.60 for mixed and 31.00 for the "other" ethnic group. A further test revealed that there was a statistically significant difference between Africans and Caucasian (p-value=0.035). There were no statistically significant differences among the other ethnic groups.

There was no statistically significant difference among the ethnic groups for EB(p-value=0.805), SOC (p-value=0.498), SEN (p-value=0.479), BIO (p-value=0.468) and ECO (p-value=0.06).

6.4.1.4. Relationships Concerning Political Parties

In comparing the mean scores of all the constructs by political party affiliations, a significant mean difference was observed for NEP, EGO and SOC. The results revealed that the mean NEP for ANC (mean=53.72), DA (mean=58.25), EFF (mean=56.25), other (mean=63.40) were statistically significant (F-value=2.941, p-value=0.04). A Tukey post hoc test revealed that the NEP scores were statistically significant between ANC and other political party.

Similarly, the result showed the mean EGO among the political parties ANC (30.46), DA (mean=30.55), EFF (mean=29.67), other (mean=25.00) differ significantly (F-value=2.917, p-value=0.04). A post hoc test revealed that there was a significant difference between DA and other (p-value=0.03) regarding EGO. There were no statistically significant differences between the other political parties.

There was a statistically significant difference in SOC values for the political parties (F-value=6.158, p-value=0.00157). The mean SOC value for ANC (mean=33.38), DA (mean=32.09), EFF (mean=29.00) and other (mean=25.00) are statistically significant. A Tukey post hoc test revealed that the SOC scores were statistically significant between ANC and other

(p-value=0.0012) and between DA and other (p-value=0.004). There were no statistically significant differences in the SOC values for the other political parties.

There was no statistically significant difference in EB (p-value=0.582), NIH (p-value=0.907), SEN (p-value=0.566), BIO (p-value=0.127), ECO (p-value=0.179) among the different political parties.

6.4.1.5. Relationships Concerning Home Language

The results show that there was a statistically significant means difference between different languages regarding NEP and Ego. The mean scores for Afrikaans, English, other foreign languages, other local languages, Xhosa and Zulu for NEP are statistically significant (p-value=0.000056). A Tukey post hoc test revealed that there was a statistically significant difference in NEP between English and other local language (p-value=0.0000529), English and Zulu (p-value=0.003). There were no statistically significant differences among the other languages regarding NEP.

There was a statistically significant difference in the means of languages regarding EGO (p-value=0.00905). There was a statistical significant difference in EGO between English and Other local languages (p-value=0.01). There was no statistically significant difference in the average EGO values between the other languages.

There were no statistically significant differences among the languages regarding EB (p-value=0.148), NIH (p-value=0.955), SOC (p-value=0.065), SEN (p-value=0.0725), BIO (p-value=0.198) and ECO (p-value=0.0621).

6.4.1.6. Relationships Concerning Household Size

The results indicated that there was no statistically significant difference in the mean scores for the different household sizes levels for EB (p-value=0.33), NEP (p-value=0.01), NIH (p-value=0.346), EGO (p-value=0.75), SOC (p-value=0.968), SEN (p-value=0.878), BIO (p-value=0.01 and ECO (p-value=0.00005).

6.4.1.7. Relationships Concerning Household Income

The results indicated that there was no statistically significant difference in the mean scores for the different household income levels for EB (p-value=0.08), NEP (p-value=0.164), NIH (p-value=0.332), EGO (p-value=0.107), SOC (p-value=0.798), SEN (p-value=0.6), BIO (p-value=0.308) and ECO (p-value=0.722).

6.4.2. Relationships of the Various Scales

Table 15 below demonstrates the significance (p-values) of Pearson-product moment correlations between the various scales. Table 16 below presents the correlation coefficients (r-values). Significant p-values (≤ 0.05) are highlighted in green while all other p-values are highlighted in orange. This highlighting is repeated in both tables to draw attention to significant correlations.

p-values	NEP	NIH	EGO	SOC	SEN	BIO	ECO
EB	0.0001926	0. 00001667	0.01306	0.005186	0.001837	0.000000008642	0.000000002829
NEP		0.3003	0.0002085	0.000003348	0.007203	0.004122	0.0002308
NIH			0.3759	0.4051	0.9763	0.0000001253	0.0001926
EGO				0.00000004409	0.1176	0.3203	0.2296
SOC					0.3625	0.069	0.08556
SEN						0.0001887	0.001243
BIO							<0.0001

Table 15. Significance of correlations (p-values)

r-values	NEP	NIH	EGO	SOC	SEN	BIO	ECO
EB	0.4	-0.4	-0.2	-0.3	0.3	0.5	0.6
NEP		-0.1	-0.4	-0.4	0.3	0.3	0.4
NIH			0.1	0.1	0.003	-0.5	0.4
EGO				0.5	-0.2	-0.1	-0.1
SOC					-0.1	-0.2	-0.2
SEN						0.4	0.3
BIO							0.7

Table 16. Pearson correlation coefficients (r-values)

6.4.2.1. Relationship of EB and NEP

The correlation coefficient (r) between EB and NEP is 0.4, which is a moderate positive correlation. The p-value of the test (p-value = 0.0001926) suggests that the correlation is statistically significant between EB and NEP. This correlation coefficient is similar to Casey & Scott's (2006), where r = 0.45.

Consequently, there is sufficient corroborating evidence, on a unidimensional perspective, to reject the *null hypothesis*: "There is no significant relationship between the environmental behaviour scale with the revised NEP scale", as well as the *general null hypothesis*: "There is no significant relationship between environmental behaviour scale and environmental concern".

6.4.2.2. Relationships between NIH and EB & NEP

The correlation coefficient (r) between EB and NIH is -0.4, which is a moderate negative correlation. The p-value of the test (p-value = 0. 00001667) suggests that the correlation is statistically significant between EB and NIH.

The p-value (0.3003) of the correlation between NEP and NIH indicates that the relationship is not statistically significant according to the data available.

Consequently, there is some evidence to reject the *null hypothesis*: "There is no significant relationship between NIH and EB", however, there is no evidence to reject the *null hypothesis*: "There is no significant relationship between NIH and the NEP".

6.4.2.3. Relationships between EGO and EB & NEP

The correlation coefficient between EB and EGO is -0.2, which is a weak negative correlation. The p-value of the test (p-value=0.01306) suggests that the correlation is statistically significant between EB and EGO.

The correlation coefficient between NEP and EGO is -0.4, which is a moderate negative correlation. The p-value of the test (p-value=0.0002085) suggests that the correlation is statistically significant between NEP and EGO.

Consequently, there is some evidence to reject the *null hypothesis*: "There is no significant relationship between EGO and EB, as well as EGO and NEP".

6.4.2.4. Relationships between SOC and EB & NEP

The correlation coefficient between EB and SOC is -0.3, which is a moderately weak negative correlation. The p-value of the test (p-value=0.005186) suggests that the correlation is statistically significant between EB and SOC.

The correlation coefficient between NEP and SOC is -0.4, which is a moderately weak negative correlation. The p-value of the test (p-value=0.000003348) suggests that the correlation is statistically significant between NEP and SOC.

Consequently, there is some evidence to reject the *null hypothesis*: "There is no significant relationship between SOC and EB, as well as SOC and NEP".

6.4.2.5. Relationships between SEN and EB & NEP

The correlation coefficient between EB and SEN is 0.3, which is a weak positive correlation. The p-value of the test (p-value=0.001837) suggests that the correlation is statistically significant between EB and SEN.

The correlation coefficient between NEP and SEN is 0.3, which is a weak positive correlation. The p-value of the test (p-value=0.007203) suggests that the correlation is statistically significant between NEP and SEN.

Consequently, there is some evidence to reject the *null hypothesis*: “There is no significant relationship between SEN and EB, as well as SEN and NEP”.

6.4.2.6. Relationships between BIO and EB & NEP

The correlation coefficient between EB and BIO is 0.5, which is an average positive correlation. The p-value of the test (p-value=0.000000008642) suggests that the correlation is statistically significant between EB and BIO.

The correlation coefficient between NEP and BIO is 0.3, which is a weak positive correlation. The p-value of the test (p-value=0.004122) suggests that the correlation is statistically significant between NEP and BIO.

Consequently, there is some evidence to reject the *null hypothesis*: “There is no significant relationship between BIO and EB, as well as BIO and NEP”.

6.4.2.7. Relationships between ECO and EB & NEP

The correlation coefficient between EB and ECO is 0.6, which is a moderate positive correlation. The p-value of the test (p-value=0.000000002829) suggests that the correlation is statistically significant between EB and ECO.

The correlation coefficient between NEP and ECO is 0.4, which is a weak positive correlation. The p-value of the test (p-value=0.0002308) suggests that the correlation is statistically significant between NEP and ECO.

Consequently, there is some evidence to reject the *null hypothesis*: “There is no significant relationship between ECO and EB, as well as ECO and NEP”.

6.4.2.8. Relationships between the Six Original Scales

As expected, ECO and BIO are strongly related. The correlation coefficient between BIO and ECO is 0.7, which is a strong positive correlation. The p-value of the test (p-value<0.0001) suggests that the correlation is statistically significant between BIO and ECO.

Additionally as expected, SEN is weak to moderately related to BIO and ECO. The correlation coefficient between SEN and BIO is 0.4, which is a weak positive correlation. The p-value of the test (p-value=0.0001887) suggests that the correlation is statistically significant between SEN and BIO. The correlation coefficient between SEN and ECO is 0.3, which is a weak positive correlation. The p-value of the test (p-value=0.001243) suggests that the correlation is statistically significant between SEN and ECO.

Also as expected, SOC and EGO are moderately related to each other. P-values between SOC and EGO with other scales indicate that the correlations are not statistically significant. The correlation coefficient between EGO and SOC is 0.5, which is a moderate positive correlation. The p-value of the test (p-value=0.00000004409) suggests that the correlation is statistically significant between EGO and SOC.

While NIH is significantly correlated with both BIO and ECO, it is counterintuitive that the correlation with BIO is negative, while positive with ECO. The correlation coefficient between NIH and BIO is -0.5, which is a moderate negative correlation. The p-value of the test (p-value=0.0000001253) suggests that the correlation is statistically significant between NIH and BIO. The correlation coefficient between NIH and ECO is 0.4, which is a moderate negative correlation. The p-value of the test (p-value=0.00000001305) suggests that the correlation is statistically significant between NIH and ECO.

Unfortunately, there is not enough available data to provide significant correlations between the remaining scales. Alternatively, the low reliabilities of the EGO, SOC, and SEN scales suggest that collecting more data may not provide significant correlations. New items should be used to assess the constructs, or an alternative instrument.

6.5. Discussion

The main research problem of this project involves determining how environmental concern can be assessed and what its relationship is with environmental behaviour. Consequently, the main research question of this project is: "Is there a significant relationship between environmental behaviour and environmental concern?". This question has been addressed by approaching environmental concern as both a unidimensional and multidimensional construct, and assessing levels of environmental behaviour with a simple environmental behaviour frequency scale, borrowed from Casey & Scott (2006). The revised NEP scale was used to provide a unidimensional scale of environmental concern. Six original scales were used to assess six constructs representing multiple underlying dimensions of environmental concern. A survey was created which requested sociodemographic information and responses to the various scales. The survey was distributed to first-year university Life Science and Economics students and responses were analysed.

While several limitations are present in this research (see Subsection 6.6), some noteworthy trends did emerge and certain conclusions may be drawn. Most significantly, it is evident that environmental behaviour and environmental concern appear to be related. The environmental behaviour scale is significantly correlated with the revised NEP scale ($r = 0.4$). This corroborates Casey & Scott's (2006) results ($r = 0.45$) (see Section 2.4). This provides sufficient evidence to reject the null hypothesis, that there is no relationship between environmental concern and environmental behaviour. While the correlation coefficient is only moderately positive, this may be attributed to an inherent imprecision in the scales designed to assess the two constructs. Since the environmental behaviour scale consists of more directly observable phenomena than abstract conceptions of environmental concern, there is an inherent difficulty in attempting to design a universal assessment of environmental concern.

In relation to the six original subscales, unfortunately three of those six subscales (egocentrism, sociocentrism, and sentiocentrism) were not reliable and consequently cannot provide meaningful statistical results. While these three subscales are not reliable, the constructs that they represent the aim of furthering the conversation of seeking more depth in understanding environmental concern and environmental behaviour in order to address climate change. Further studies which

attempt to utilize these constructs should pay careful attention to designing items to assess these constructs and preferably pilot associated scales to ensure their reliability (discussed further in Subsections 6.6.1.2 & 6.6.1.3).

The remaining three subscales, however, are reliable and do have meaningful statistical results. First, in relation to the nihilism subscale and the environmental behaviour scale, r = -0.4 which is interpreted as a moderate negative correlation. This is intuitive since the nihilism construct is intended to represent a general apathy, or lack of concern, towards environmental issues and translates into reduced engagement with environmental behaviours. The moderate negative correlation here implies that greater amounts of nihilism successfully predict less engagement with environmental behaviours.

In relation to the biocentrism and ecocentrism subscales, both have moderate positive correlations with the environmental behaviour scale. The biocentrism subscale has an r-value of 0.5 while the ecocentrism subscale has an r-value of 0.6. these values are intuitive since the associated constructs are intended to represent concern for living entities and processes related to living entities. Demonstrating concern for such phenomena suggests a desire for their well-being and consequently, to reduce negative effects of climate change.. Greater amounts of biocentric and ecocentric concern successfully predict more engagement with environmental behaviours. While both of these subscales are reliable, future studies may wish to modify, add, or remove certain items from the subscales in order to sufficiently adapt them to their end goals.

One exceptionally noteworthy finding is that the biocentrism and ecocentrism subscales both yield stronger correlations with the environmental behaviour scale than the revised NEP scale. The environmental behaviour scale and the revised NEP scale's r-value is 0.4, being moderately strong. This suggests that either the biocentrism and ecocentrism subscale may be used as a better predictor of environmental behaviour than the revised NEP scale. However, the NEP and revised NEP scales have undergone significant development while the biocentrism and ecocentrism subscales have only been used in this project. While their associated constructs have been used in other studies (for example, the ecocentrism scale in Thompson & Barton, 1994), corroboration of these two subscales would be necessary in order to conclude that they are superior predictors of

environmental behaviour than the revised NEP scale. These results do, however, suggest that seeking to identify underlying dimensions of environmental concern is a task which may yield fruitful results and is a meaningful undertaking. Promoting the conversation of underlying dimensions of environmental concern appears likely to improve our understanding of environmental behaviour and subsequently, aid in forming strategies of how to approach and address climate change.

6.6. Limitations

This section discusses particular limitations of this project's study. For simplicity, discussions are divided into two categories. First, survey design issues, such as not including age as a sociodemographic item, content validity of the original scales, contextual relevance, the length of the survey and an associated ordering effect are discussed. Second, procedural challenges are discussed.

6.6.1. Survey Design Issues

6.6.1.1. Not Requesting Respondent's Ages

The first limitation involves not requesting respondent's ages as a sociodemographic variable. When designing the survey, it was assumed that first-year university students would all be aged between 18 and 19. However, after careful thought and consideration, it is clear that respondents' ages should have been requested since there probably are a few outliers, either being significantly older or younger than the majority of respondents. Unfortunately, it is impossible to reconcile this limitation since data collection has already occurred.

6.6.1.2. Content Validity of Original Scales

It evident that the six original scales designed specifically for the constructs used in this project. Have several limitations. All items were phrased so that agreement is intended to indicate a positive score on the scale. Additionally, items were written with considerations from their construct's

associated discussions in Chapter 3. Consulting with experts and reviewing items with them may have resulted in more reliable and valid original scales. It is evident that the egocentrism, sociocentrism, and sentiocentrism scales were the least successful scales, with low reliabilities, and insignificant correlations.

6.6.1.3. Construct Validity of Original Scales

Related to the discussion above involves the construct validity of the original scales. It is important to differentiate the construct being assessed, from the instrument used to assess it. As discussed above, while the content of the original scales may at times not be valid, that does not imply that the constructs themselves are invalid and necessarily fail at relating to their intended phenomenon.

However, it is clear that the egocentrism, sociocentrism, and sentiocentrism scales require development in order to successfully relate to their intended constructs. For example, sociocentrism was constructed from concern for other humans presently alive and concern for future generations. Similarly to how anthropocentrism was subcategorized into egocentrism and sociocentrism, sociocentrism may need to be subcategorised, or replaced with, two separate categories relating to concern for other humans presently alive and future generations. Egocentrism had a similar problem, with two clearly differentiated sets of items. Although it is suspects that the two sets emerge due to some items containing more complex concepts, it is not entirely clear why these two sets emerge. It is clear that more carefully written and robust items are required to assess egocentrism. Sentiocentrism items also did not produce a reliable scale, and on close inspection, several of the items appear complex and may require more consideration than other items, on the part of the respondents.

6.6.1.4. Contextual Relevance

The various scales and constructs used in this study were adopted from research being conducted in Western contexts. The environmental behaviour scale was developed and used on an Australian context (Casey & Scott, 2006). The revised NEP scale was developed in America. The six original

scale were designed with inspiration from constructs derived from western philosophy and approaches to ethics. Subsequently, it may not be clear if the various scales and construct are relevant to assessing environmental behaviours and environmental concern in the South African context. However, the established scales are well designed, with the revised NEP scale being reliable and having a lot of corroborating data and wide spread use (Dunlap *et al*. 2000), and the environmental behaviour scale having been designed with expert review from Greenpeace Australia (Casey & Scott, 2006) – it is also not impossible that they are relevant in a South African context. Indeed, the data and analyses appear to corroborate this claim, with correlations derived from data collected in a South African context corroborating the hypothesis that environmental behaviour and environmental concern are related. In relation to the six constructs, those constructs were operationalized as a multidimensional assessment of environmental concern. While scales designed to assess those constructs may lack content validity, the constructs do appear valid and were selected with the intention of providing a deeper understanding of environmental concern than previous multidimensional assessments. For those reasons, all of the various scales and their associated constructs are arguably relevant for use in the South African context and may others.

6.6.1.5. Length of Survey and Ordering Effect

The above two discussions demonstrate challenges to creating an original set of scales. In addressing this challenge, the six original scales were written with 10 items each. At the time of writing, 10 items per original scale was deemed sufficient – the environmental behaviour scale consists of 17 items and the revised NEP scale consists of 15 items. While 10 items per original scale is less than both established scales, they result in 60 additional items being added to the survey. This resulted in a relatively long survey, at 103 items in total.

This resulted in a clear ordering effect, where each subsequent section. in the survey receives less respondents than the previous section. However, the high item count is justified based on the desired outcome of the study. Nonetheless, it would be desirable to have additional samples, or repeated sample from another tertiary institution.

6.6.2. Ethics Clearance and Research Approval Delays

The degree which this project is completed in partial fulfilment towards, is an interdisciplinary degree. While it was originally hosted by the School of Animal, Plant, and Environmental Studies, the topic is better classified as a social science. This created the challenge that there was no clear ethics committee at the university responsible for approving the research ethics of this project. After several delays, an *ad hoc* social science ethics committee approved the project and issued an ethics clearance certificate. Several delays resulted in a long waiting time before the survey could be administered to the desired populations. With the prospect of additional lengthy delays by attempting to repeat data collection on the same, or additional, populations, the samples used in this study were deemed sufficient for present purposes and time remaining before submission.

Chapter 7 – Implications and Recommendations

7.1. Introduction

Leichenko & Eisenhauer (2017) identify three response categories to climate change. Firstly, the "do nothing" response which concerns humans maintaining their status quo, and may include denying scientific bases of climate change. The "do nothing" response is clearly the least preferable response as it is most likely to continue driving climate change. Second, and what this project thoroughly endorses, the mitigation response which include '… for example, reduce net emissions of greenhouse gases, acidifying substances or ozone-depleting substances into the atmosphere or reduce the rate of deforestation or land-cover change' (Leichenko & Eisenhauer, 2017, 6230). Third is the adaptation strategy. Thompson (2010) notes that adaptation is reactive. '… it involves reducing the potential adverse impacts on societal well-being resulting from the by-products of climate change' (Thompson, 2010, 152). Instead of attempting to prevent climate change, but no failing to act, some people may take steps toward surviving rather than mitigating climate change. Examples of adaptation strategies include developing sea barriers, relocating to less inhospitable regions, and developing new agricultural practices. (Thompson, 2010). This project has thoroughly endorsed adopting mitigation strategies in relation to climate change. While adaptation strategies are not terrible and certainly a necessary facet of overall climate strategies, the adaptation strategy is reactive, yet climate change requires action. Preventing crises are assumed to be better than curing them. Additionally, Evans notes that mitigation is relatively simple – '[i]f you eliminate a ton of greenhouse gas (GHG) emissions anywhere in the world, it has the same impact on the concentration of GHGs in the atmosphere' (2010, 184).

Arguably, the first and most critical step in mitigating climate change is fixing the damage and destruction that humans have already caused. Secondly, a wider range of sub-strategies can be utilized to fix damage done. Such sub-strategies may, relate to restoring damaged ecosystems, shutting down factory farms, and reducing endangered species trade. These strategies may be operationalized in at least three ways, which form the basis of the implication of this project. To promote theoretical development of ethics theories, develop interventions to cultivate sound moral

compasses in future generations, and communicating the severity of climate change and the need to engage in environmental behaviours to people presently alive, or environmental communication.

Implications for ethics are discussed first. Since this project has presented several theories from environmental ethics, and since it is important to determine what actions should be taken in response to climate change, it is desirable to provide a related discussion. Furthermore, the two intervention strategies discussed here require a sound ethics basis for their discussions. Since there are a several theories discussed in this project, a moral relativist perspective may be taken however, clear and unambiguous prescriptions are desirable and required in order to mitigate harmful impacts from climate change, as moral objectivism requires. This is followed by discussing environmental education and environmental communication as two intervention strategies.

7.2. Implications for Ethics

The approach adopted to environmental ethics in Chapter 3 is arguably a moral relativist perspective towards the value-orientated theories, permitting different people to hold relatively sound, but differing, moral truths. While moral relativism is not necessarily a superior approach to ethics, it is compatible and resonates well with the intuition that people hold different moral beliefs. Moral relativism versus moral objectivism is one of the four areas of empirical research which Knobe *et al*. (2012) place under the umbrella of experimental philosophy. Knobe *et al*. express that the issue of moral relativism versus moral objectivism is an issue '… has generated tremendous controversy in the philosophical literature' (Knobe *et al*., 2012, 86). Some philosophers have argued that answers to moral questions are objective like scientific facts (Shafer-Landau 2003, Smith 1994 both in Knobe *et al*., 2012). Much like facts from science, such as the Earth being round, moral objectivism views moral facts are objective i.e., all actions can be viewed as right or wrong. Other philosophers view morals as fundamentally relative (Dreier 1990; Harman 1975; Prinz 2007; Wong 1984, 2006 all in Knobe *et al*., 2012) i.e., whether something is right or wrong is relative to the social norms. Clark (1995) provides an example of a nineteenth-century French physician which sheds some clarity on moral relativism. The French physician, while visiting and teaching anatomy in China, asked for cadavers to use for dissection. The Chinese met him with a horrified response – since the dead are sacred to the Chinese, they could not be offered

for dissection however, the French physician was offered as many live criminals as he wished, 'To which the good French doctor expressed his own horrified revulsion' (Clark, 1995, 63). These examples make moral relativism clear, opinions relating to moral issues are not always clear, and indeed people do hold different beliefs.

The trouble with moral relativism is that it does not clearly and unambiguously prescribe clear or particular answers to ethical deliberations. This results in committing the bandwagon fallacy and an "anything-goes" view of morality. Moral norms can vary so widely that ethics and moral deliberations are unnecessary – the right answer to all moral deliberations are entirely dependent on what a society believes are true. The fact-value distinction discussed in chapter 4 Section 2 explains that because some phenomenon occurs, or that the world happens to be a certain way, does not imply that the phenomenon *should* occur, or that the world should be the way it is. Thus, the fact-value distinction suggests that there is something problematic in deriving moral prescriptions from facts about the world. Furthermore, metaphysical nihilism suggests that the only reasons to change the world into a certain way, originate from humans.

Most critically, an ethical theory which prescribes what particular action to take when faced with a complex moral problem, such as climate change, is a desirable trait in a moral theory. In relation to environmental ethics, while often offering some prescriptions to right action, those prescriptions can readily result in contradictions and absurdities, resulting in no clear prescribed action for a moral deliberator. To illustrate, suppose some human family needs firewood to keep warm at night during the cold winter months. Supposing that the only way to obtain firewood is by cutting down trees, a sociocentrist, or weak non-egalitarian would say that the family should cut down the tree. Since humans have the most intrinsic value, their priorities are the most important. An ecocentrist, or strong non-egalitarian would say that the tree should be left standing. Since humans emit far too much CO2 already, compromising ecosystems around the globe, and removing a tree for burning directly worsens the state of the immediate ecosystem, the tree should be left standing and the human family should suffer the cold. While sociocentrism and other forms of anthropocentrism are appealing, initial prescriptions of right actions are unclear. Initially, sociocentrism prescribes placing the good of societies and human civilisations above all else. In the illustration above, sociocentrism prescribes cutting down the tree since the human family will be kept warm.

However, as one is cut down, less CO2 can be absorbed. This is expected to worsen certain climate change impacts and have an overall detrimental effect on human societies and civilisations. Consequently, after considering down-stream effects, sociocentric prescriptions become unclear. Cutting down the tree will benefit one family, but result in a net loss for all of humanity. This relates strongly to over-population and is expanded in Hardin's (2009) Tragedy of the commons. Hardin explains that as a population grows on a finite world, '… the per capita share of the world's goods must steadily decrease' (Hardin, 2009, 244). While several resources on Earth can replenish themselves to some degree, the total resources on Earth, at any given point, is limited. Consequently, 'A finite world can support only a finite population' (Hardin, 2009, 244) and that '… population growth must eventually equal zero' (Hardin, 2009, 244). The tragedy Hardin (2009) discusses relates to individual people exploiting some resource to their own benefit when impacts on other humans are only marginal. In relation to the illustration, the benefit which human families gain by cutting down a tree is vastly greater than the negative impacts all other people have from the loss of that tree. The family gets to keep warm by burning the wood, and CO2 absorption from the loss of that single tree for each person around the globe is very low. Thus, it initially appears permissible to cut down the tree. The impermissibility of cutting down the tree is made explicit when it becomes apparent that the same argument applies to each human family who is cold and wants to cut down a tree. The tragedy is that most human families would cut down the trees, resulting a net CO2 absorption loss far greater and severe than a single family cutting down a tree initially suggests.

Considering the illustration above, if there were less families that needed to cut down trees to be warm, tree populations would have enough time to replenish themselves and there would be enough trees standing to absorb excess CO2. Climate change suggests that humans have already over-populated the earth and are consuming too many resources, such as the trees in the illustration above. Consequently, prescriptions from sociocentrism and non-egalitarian weak-forms result in logical contradictions where what appears to be the right action for some humans has negative impacts on other humans. It might appear that ecocentrism and non-egalitarian strong-forms are preferable ethical doctrines, in light of the climate change crisis. Further research involving conceptual analysis, identifying logical contradictions, and numerous theoretical developments is needed. While it is desirable to have single theory from ethics to prescribe what actions to take

when facing a moral problem as significant as climate change, at present, there is not a single theory from value-orientated environmental ethics which is clearly preferable, and attempting to conceive of the theories as compatible often results in logical contradictions. At present, the environmental ethics theories should be viewed as providing relative prescriptions, where the superior theory must be inferred relative to the problem being dealt with. Ecocentrism and non-egalitarian strong-forms provide extreme environmental prescriptions, while anthropocentric views and non-egalitarian weak-forms remain useful in not discounting humans from the moral deliberations process. However, the results in Chapter 6 do suggest that promoting biocentric and ecocentric perspectives are superior ethical positions to adopt in addressing climate change. While more work is needed to thoroughly develop these perspectives and their associated scales, it is intuitive that increasing biocentric and ecocentric concern will lead to further engagement with environmental behaviours and subsequently aid in addressing climate change. So long as ethical nihilism is avoided, it might be possible to mitigate harmful impacts of climate change on several entities.

7.3. Intervention Strategies

Gardener & Stern (1996 in Stern, 2000) reviewed evidence relating to four types of interventions: religious and moral approaches; education and providing information; changing material incentives or proving monetary rewards and penalties; and community management. '… each of these intervention types, if carefully executed, can change behaviour' (Stern, 2000, 419). However, Stern (2000) notes that the best approaches involve combinations of the intervention types. Developing moral approaches has been a large focus of this project. The section above (Section 7.2) discussed implications for ethics and relates to the first type of intervention. Thompson & Barton suggest that their ecocentric-anthropocentric distinction may be useful for interventions '… such as the design of messages to encourage conserving behaviours' (1994, 156). The heuristic model presented at the end of Chapter 3 provides a depiction of an expanded narrative which may better facilitate and frame environmental education and environmental communication interventions than constructs relating to the common narrative, although focus should be maintained on increasing biocentric and ecocentric concern. The following two subsections provide brief discussions relating to environmental education and environmental communications.

7.3.1. Environmental Education

'Education is the most powerful weapon we can use to change the world' (Mandela, 2012, 101). It is clear that radical transformation of human societies and cultures is required in order to mitigate or adapt to climate change. While Nelson Mandela was probably referring to social change when he made this iconic statement at the Wits Planetarium, the same may be true for environmental issues and climate change. Leopold believed that through environmental education relating to seeing value and beauty in the land '… we come to discover the loss of value and beauty that many of our individual and collective actions have inflicted and are inflicting on the land' (Nelson, 1998, 743). Resonating with moral relativism, Leopold suggested that people's knowledge of the world is greatly influenced by their vision of the world. 'Leopold recognized that the discoveries of ecology were not just a collection of interesting scientific facts but that they had fundamental philosophical implications. For Leopold, ecological science had the potential to alter worldviews and ethical behaviour as well' (Nelson, 1998, 743).

This statement resonates strongly with ecocentrism. As our knowledge of ecology increases, so should the awareness of our inherent interrelatedness with ecosystems be increased. Knowledge and awareness that ecosystems can be damaged and that such damage translates into damaging and harming ourselves should be made explicit in environmental education programmes. Since environmental concern is somewhat linked to environmental behaviours, incorporating value-extending segments into education programmes for children and adults may deepen their appreciation for "nature" appears likely to improve their environmental behaviours. Subsequently, mitigating climate change.

7.3.2. Environmental Communications

There is a '… growing realization among campaigners and practitioners that climate change messages have not effectively reached large swaths of the general public (internationally)' (Corner, Markowitz & Pidgeon, 2014, 416). Practitioners of environmental and climate change communications include '… [Non-Governmental Organisations (NGOs)], civil society groups and government officials…' (Corner, *et al*., 2014, 416). Corner *et al*. continue that these groups are '…eager to understand how to more effectively engage the public on this issue' (2014, 416).

Corner *et al*. (2014) discuss two approaches in value-based climate change campaigning. The first approach involves messages orientated towards self-transcendent values, such as sociocentric, sentiocentric, biocentric, and ecocentric values. Second, '… to identifying values that target populations actually hold' (Corner *et al*., 2014, 416). Corner *et al*. (2014) allude to the distinction between egocentrism and other values. '… those who more strongly endorse self-enhancement values have come to view action on climate change as an (implicit) attack on their values, and something that should only be pursued if it is in their individual self-interest' (Corner *et al*., 2014, 416), while people with '… self-transcendent values have come to view climate change as a serious problem requiring immediate ameliorative action' (Corner *et al*., 2014, 416),

A core goal of this project is to express that the conversation of climate change and ethics requires seeking underlying dimensions of environmental concern. While discussing the distinction between pursuing goals relating to self-interest or self-enhancement and, self-transcendent values, is undoubtedly of value, it has clear limitations. Questions such as "what are self-transcendent values?" and "how can they be achieved?" can be expected to go unanswered, with the focus being placed on diminishing self-interest in favour of self-transcendent values. By opening the discussion to sociocentrism, sentiocentrism, biocentrism, and ecocentrism provides clear answers to the aforementioned questions and may stimulate more fruitful debate. Of course, whether these topics are appropriate for a discussion depends greatly on the context of the discussion and is intrinsically linked to the previous subsection concerning environmental education. It would be very difficult, if not impossible, to discuss various self-transcendent ideas with a person who is not aware of such possibilities. Consequently, discussing the distinction between self-interest versus self-transcendence may be more valuable in such a situation. However, if discussing how to operationalize self-transcendence, then the heuristic model provided at the end of Chapter 3 and its associated constructs provide a clear map and topics for consideration to stimulate debate and discussion.

Chapter 8 – Conclusion

8.1. Lack of Environmental Concern in South African President's SONAs

The previous chapter (Subsection 7.3.1) quoted an iconic statement made in 2003 at the Wits Planetarium by the late former President of South Africa Nelson Mandela, regarding the important role of education in developing a nation. In that same year, the then South African President Thabo Mbeki's State of the Nation Address (SONA) (Mbeki, 2003) made only a single mention of the term "environment", and it was in reference to the macro-economic environment, rather to than the natural environment or an ecosystem. This lack of environmental sentiment is echoed in former South African President Jacob Zuma's SONA (Zuma, 2017), where the term "environment" was mentioned only four times, of which only a single occurrence involved bio-physical or natural processes relating to water management and ecosystems, opposed to three mentions of economic-environmental factors. Yet again, no mention of climate change was made. Based on the increasing severity of climate change at a national level, it is not unreasonable to expect an increase in the frequency of "environment" or "climate change" being mentioned in SONAs and other important speeches.

On 24 October 2017, News24 reported that the City of Cape Town began its first phase of its Critical Water Shortages Disaster Plan (Chabalala, 2017), where pre-selected suburb's water supply is limited to the point of taps running dry. The IPCC, the leading international body for the assessment of climate change, expresses with very high confidence that 'Impacts from recent climate-related extremes [including droughts] … reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability' (IPCC, 2014, 53) and includes disruption of water supply and damage to infrastructure and settlements. The IPCC continues by expressing that '… these impacts are consistent with a significant lack of preparedness for current climate variability in some sectors' (IPCC, 2014, 53).

It is clear that climate change is beginning to disrupt human lives and civilisations. Given the low frequency in which the South African Presidents' address' mention "environment" and the sheer lack of reference to climate change at all, it is little wonder that the IPCC expresses "a lack of preparedness" in reference to managing detrimental effects of climate change, such as the City of Cape Town's water crisis. Furthermore, the South African Presidents' focus on economic development suggests a naïve or under-developed understanding of underlying factors which contribute to economic development. It is becoming increasingly recognized that the biosphere has a heavy influence on economic development, with the concept of the environment as a type of capital becoming '… widely adopted because it is both simple and appealing' (Harte, 1995, 157). Indeed, this notion is echoed by the previous United Nations (UN) President, Ban Ki Moon, where he expressed that 'Saving our planet, lifting people out of poverty, advancing economic growth ... are one and the same fight' (Ki Moon, 2011). This quote clearly demonstrates a more developed conception of the interrelatedness of crises on the part of the former UN President than the South African Presidents.

It may be expressed that, in the SONAs, the South African Presidents demonstrated a lack of environmental concern. Given that climate change threatens to abruptly disrupt human societies and civilisations, it is clear that much work and further research needs to be done rapidly in order to raise environmental concern not only in human populations, but in national leaders too. The research presented in this project demonstrates different underlying reasons for environmental concern and provides a basis for understanding different perspectives and developing appropriate intervention strategies to exploit on a wide range of candidates.

8.2. Conclusion

Attempting to improve the understanding of environmental concern is a challenging, multifaceted and complex undertaking. The concept itself is not clearly defined or understood. Since it is reliant on a non-static, ambiguous and poorly understood conception of "nature", varying valid interpretations of the concept are permissible. This project had two main purposes. First, to understand dominant approaches to, and assessments of, environmental concern. This was used to

develop heuristic models of environmental concern research. Displaying relations between constructs and providing key concepts for developing and incepting value-based environmental ethics into the human population. Second, to provide empirical data to support the final heuristic model and to demonstrate utility of the various approaches, constructs and, assessments displayed in the heuristic models (Section 2.5 & 3.6). These purposes included assessing the relationship between environmental concern and environmental behaviour, as well as appraising and assessing underlying dimensions of environmental concern. For convenient and intuitive separation of topics, this project is divided into 8 chapters.

Chapter 1 served as an introduction and identified the inherent complexity in understanding "nature" and discussing associated environmental concern. The main task of Chapter 2 was to examine previous assessments of environmental concern and thus discuss prior conceptions and operationalisations of environmental concern. The NEP scales were presented as well-establish unidimensional assessments of environmental concern, treating environmental concern along a single continuum. Examining two multidimensional assessments, or assessment seeking underlying reasons for environmental concern demonstrated two important factors. First, constructs need to be well defined. Second, the common narrative they use to define constructs is outdated and too anthropocentric. Additionally, this chapter discussed a comparative study which provided an environmental behaviour scale and assessed relations between two previous assessments of environmental concern. Providing a heuristic model which demonstrates how unidimensional and multidimensional approaches provide different perspectives on the same phenomena and concludes that gaps between the multidimensional assessments should be filled and a deeper perspective provided. Chapter 3 provided constructs intended to describe a deeper perspective of environmental concern. Presenting an overview of value-orientated theories from environmental ethics, constructs relating to an expanded narrative of environmental ethics demonstrate several underlying reasons for environmental concern and fill the gaps evident between the multidimensional assessments. The theory map and third heuristic model presented at the end of the chapter provide overviews of the constructs and an easy way to frame multidimensional assessments as well as intervention strategies. Chapter 4 provided a conceptual framework, discussing the severity of climate change and associated cross-disciplinary research required for approaches. Experimental philosophy and empirical ethics were discussed as guiding

methodologies. Three meta-ethical considerations and two considerations from the philosophy of science aid in contextualizing research relating to assessments of environmental concern. The meta-ethical considerations explain that moral conclusions should not be derived from facts about the world. The considerations from the philosophy of science interpret environmental concern assessments as anti-realistic, or as not describing the world as it actually is.

Chapter 5 provided methods for empirically assessing whether environmental behaviour is related to environmental concern. A quantitative, descriptive, cross-sectional non-experimental design was adopted and a comprehensive survey was produced. Two subpopulations, first-year Life science and first-year economics students were conveniently sampled. Ethics clearance and permission from various Heads of Schools was obtained, student email addresses were obtained, and the survey was distributed electronically to them.

Chapter 6 analysed the data collected from the two samples and discussed the results. from the study described in Chapter 5. Including two established scales, an environmental behaviour scale and the revised NEP scale, provided corroborating data and a direct way of testing whether environmental behaviour is related to environmental concern. Including the six original scales was intended to assess underlying dimensions of environmental concern. A reliability analysis demonstrated that the two established scales are reliable, while three of the original scales reliability coefficients are too low to consider them as reliably assessing their underlying construct. Descriptive statistics were tabulated and presented summaries of responses to sociodemographic items, frequencies of engaging in environmental behaviours and levels of agreement with NEP items and the six original scales. Relationships between variables were then presented. An independent sample t-test and analysis of variance (ANOVA) were performed on the sociodemographics and the various scales. Correlations between the various scales were calculated, tabulated and are presented. The relationship between the environmental behaviour scale and revised NEP scale is statistically significant and being a moderate positive relationship. Further significant correlations concerning the six subscales and their relationship with environmental behaviour and environmental concern were discussed. Although there were significant challenges and limitations in conducting this research, the biocentric and ecocentric subscales were found to be the best predictors of environmental behaviour, even out shining the

revised NEP scale. This suggests that raising biocentric and ecocentric concern is likely to increase the amount and frequency of engagement with environmental behaviours and, subsequently reduce the negative impacts of climate change. Specific limitations of this study, such as challenges in designing various items and sections of the survey, content and construct validity, contextual relevance, and procedural challenges, were discussed.

Chapter 7 discussed implications for ethics and two types of interventions, which constructs on the theory map may be useful in framing and better understanding. Cultivating sound environmental ethics in populations is necessary to address climate change. The two types of interventions discussed are environmental education and environmental communications. Using either of these approaches to cultivate sound environmental ethics in people may help to address climate change. Constructs from the theory map may provide useful to these interventions by helping to better frame and understand appropriate strategies.

As demonstrated by the South African President's apparent lack of environmental concern, as demonstrated in their SONAs, there is a clear need to facilitate and develop environmental concern at numerous levels of society.

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Appendix A: Summary of Environmental Behaviour Scale Items

EB1	Where possible, I buy products made from recycled materials as opposed to those items not made from recycled materials.
EB2	I re-use plastic shopping bags for future shopping and/or other purposes.
EB3	I avoid using aerosol sprays.
EB4	I turn the television off when it is not in use.
EB5	I take short showers to limit water use.
EB6	I recycle newspapers.
EB7	I buy products with minimal packaging (e.g., products that are packaged in a minimal amount of plastic).
EB8	When inside, and if sufficient sun light is shining through the windows, I use sun light as opposed to artificial light.
EB9	I use the washing machine only when it has a full load.
EB10	I compost non-meat food scraps.
EB11	When writing I use both sides of the paper.
EB12	When travelling short distances (Approx. 1 – 2 kilometres) I walk as opposed to driving or taking a bus.
EB13	When cleaning my teeth I turn the tap off rather than leaving it run.
EB14	I recycle glass materials.
EB15	When I buy a few items at the store I say no to plastic bags.
EB16	I turn the stereo/radio off when it is not in use.
EB17	When available I half flush the toilet as opposed to full flush.

Appendix B: Summary of Revised NEP Scale Items

NEP1	We are approaching the limit of the number of people the earth can support.
NEP2	Humans have the right to modify the natural environment to suit their needs.
NEP3	When humans interfere with nature it often produces disastrous consequences.
NEP4	Human ingenuity will insure that we do NOT make the earth unlivable.
NEP5	Humans are severely abusing the environment.
NEP6	The earth has plenty of natural resources if we just learn how to develop them.
NEP7	Plants and animals have as much right as humans to exist.
NEP8	The balance of nature is strong enough to cope with the impacts of modern industrial nations.
NEP9	Despite all our special abilities humans are still subject to the laws of nature.
NEP10	The so-called “ecological crisis” facing humankind has been greatly exaggerated.
NEP11	The earth is like a spaceship with very limited room and resources.
NEP12	Humans were meant to rule over the rest of nature.
NEP13	The balance of nature is very delicate and easily upset.
NEP14	Humans will eventually learn enough about how nature works to be able to control it.
NEP15	If things continue on their present course, we will soon experience a major ecological catastrophe.

Appendix C: Summary Nihilism (NIH) Scale Items

NIH1	It doesn't matter what happens in the future.
NIH2	We don't need to protect anything.
NIH3	I don't care if the environment is destroyed or damaged.
NIH4	Ultimately, everything we do has no meaning.
NIH5	All our beliefs are wrong.
NIH6	Environmental issues are not important.
NIH7	My life, and everyone else's lives, are meaningless.
NIH8	I don't think there is any reason to have morals or act ethically.
NIH9	I do not get upset when the environment is harmed.
NIH10	We should not try to conserve resources.

Appendix D: Summary Egocentrism (EGO) Scale Items

EGO1	The environment should be protected, so that I can have a good future.
EGO2	I place great value on things that I own.
EGO3	I want to get more things that are useful to me.
EGO4	My personal endeavors are very important to me.
EGO5	Natural areas should be protected so that I can enjoy them
EGO6	Laws and regulations concerning the environment limit my choices and freedom.
EGO7	I find it difficult to become concerned about environmental issues that don't affect me.
EGO8	The best thing about renewable energy is that it can save me money.
EGO9	I do not want to recycle anything.
EGO10	My friends might describe me as selfish.

Appendix E: Summary Sociocentrism (SOC) Scale Items

SOC1	It is important to protect the environment for future generations.
SOC2	Securing a good future for children is very important.
SOC3	We should protect the environment so that all people can have a good future.
SOC4	Society's needs are more important than the environment.
SOC5	It is important to always try and save other people's lives.
SOC6	The environment should only be protected unless someone's job might be lost because of it.
SOC7	It is ok to damage a part of the environment if we can make a new medicine from it.
SOC8	We should improve our standard of living, even if we damage the environment.
SOC9	I worry that there will not be enough resources for future generations.
SOC10	Human life is more important than anything else.

Appendix F: Summary Sentiocentrism (SEN) Scale Items

SEN1	We should stop testing cosmetic products on animals because it harms them.
SEN2	I do not harm pets, because it causes them pain.
SEN3	Something's capacity to feel pain determines how valuable it is.
SEN4	Gorillas and Chimpanzees are more important than other animals because they are more like humans.
SEN5	When something is conscious, it is more important than other things.
SEN6	I will go out of my way to help something which is suffering.
SEN7	It is ok to feed less developed creatures, like worms, to my pets which eat them, like birds.
SEN9	Even if it is useful to science, we should not use animals in laboratory tests.
SEN 10	I am, or might become, a vegetarian because most farms do not treat animals ethically.

Appendix G: Summary Biocentrism (BIO) Scale Items

BIO1	Trees and other plants should be protected because they deserve to continue living.
BIO2	I get upset when I find out that an endangered species died.
BIO3	If something is alive, then it should be protected.
BIO4	It is important to grow and nurture plants, even if I can't use them for anything specific.
BIO5	When I find pest animals in my home, I try to move them outside instead of killing them.
BIO6	Plants and animals are both very valuable.
BIO7	Pollution is bad for animals and plants.
BIO8	If I could, I would stop people from cutting down trees.
BIO9	Life is something which should be revered.
BIO 10	I respect everything which is alive, just because it is alive.

Appendix H: Summary Ecocentrism (ECO) Scale Items

ECO1	It is important to consider relationships between living things when planning future projects.
ECO2	We should protect landscapes and local areas, as well as any plants and animals which live there.
ECO3	Wilderness areas and species should be protected simply so that they continue to exist.
ECO4	Areas and spaces outside the city are important areas for conservation.
ECO5	The honey bee plays an important role in maintaining healthy ecosystems.
ECO6	I become upset when a natural area is cleared for buildings or construction.
ECO7	If agriculture damages a natural space, the damage should be prevented, minimized, or compensated for.
ECO8	I experience a feeling of connectedness when I am in nature.
ECO9	Nature is valuable, independent of what people use it for.
ECO10	Our conceptions of ecosystems are incomplete, but hold great promise.

Appendix I: Sociodemographic Items in Electronic Survey

Participant Particulars

* 2. At which University are you enrolled?
- ◯ Wits
- ◯ Other

* 3. Which degree are you registered for?
- ◯ BCom
- ◯ BSc
- ◯ BA
- ◯ Other

* 4. Which course are you registered for?
- ☐ Economic Theory
- ☐ Introductory Life Sciences
- ☐ Other

* 5. Are you a South African citizen?
- ◯ Yes
- ◯ No
- ◯ Prefer not to say

* 6. What is your gender?
- ◯ Male
- ◯ Female
- ◯ Other
- ◯ Prefer not to say

* 7. What is your ethnicity?
- ◯ African
- ◯ Caucasian
- ◯ Indian
- ◯ Asian
- ◯ Mixed
- ◯ Other
- ◯ Prefer not to say

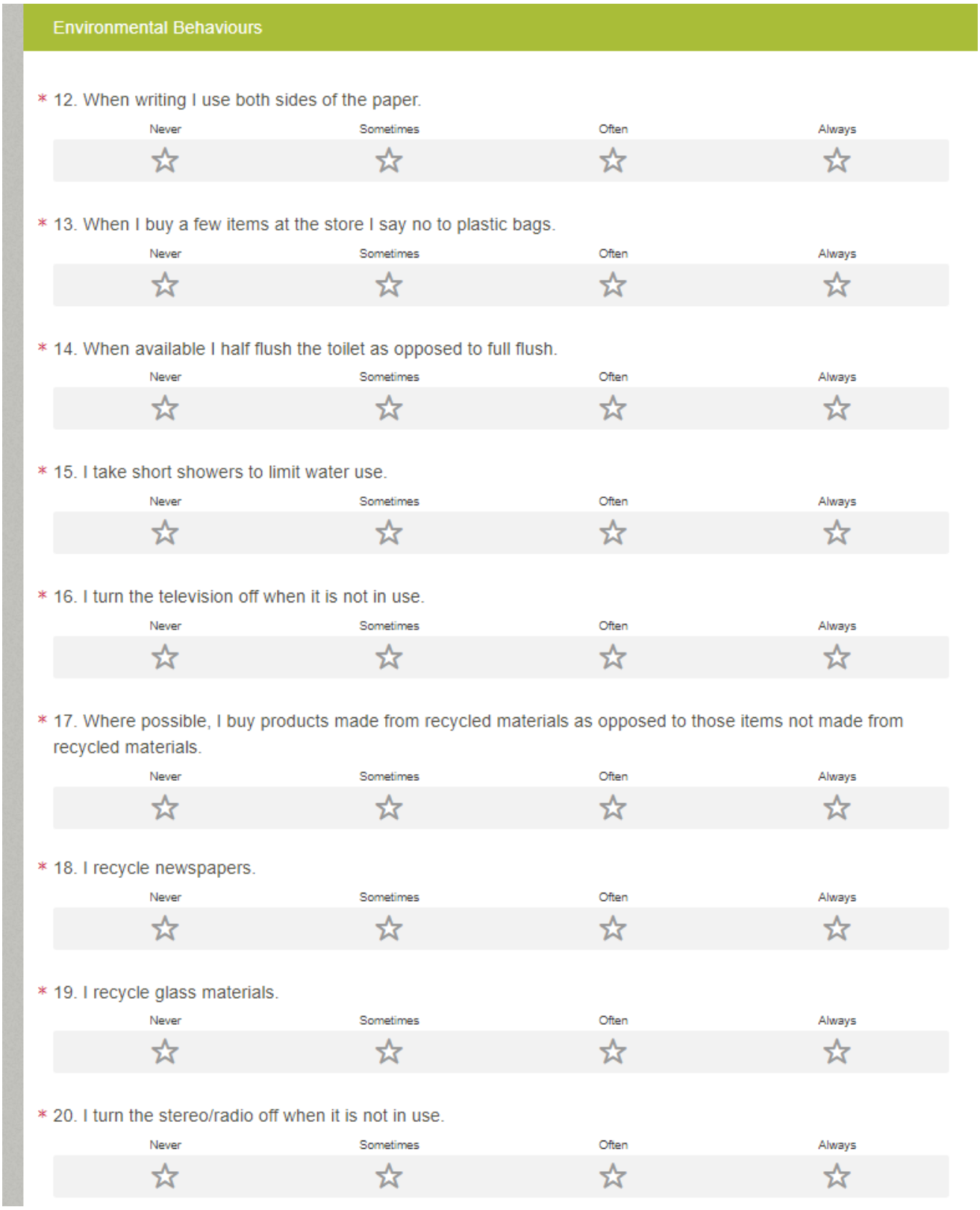
* 8. What is your political identification?
- ◯ ANC
- ◯ DA
- ◯ EFF
- ◯ IFP
- ◯ UDM
- ◯ ACDP
- ◯ Other
- ◯ Prefer not to say

* 9. What is your first/home language?
- ◯ English
- ◯ Afrikaans
- ◯ Zulu
- ◯ Xhosa
- ◯ Other local language
- ◯ Other foreign language
- ◯ Prefer not to say

* 10. How many people live in your household?
- ◯ 1
- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6+
- ◯ Prefer not to say

* 11. What is your household's total monthly income?
- ◯ Less than R5 000
- ◯ R5 000 - R10 000
- ◯ R10 000 - R25 000
- ◯ R25 000 - R50 000
- ◯ R50 000 - R100 000
- ◯ More than R100 000
- ◯ Prefer not to say

Appendix J: Environmental Behaviour Items in Electronic Survey



Environmental Behaviours

* 12. When writing I use both sides of the paper.

Never Sometimes Often Always

* 13. When I buy a few items at the store I say no to plastic bags.

Never Sometimes Often Always

* 14. When available I half flush the toilet as opposed to full flush.

Never Sometimes Often Always

* 15. I take short showers to limit water use.

Never Sometimes Often Always

* 16. I turn the television off when it is not in use.

Never Sometimes Often Always

* 17. Where possible, I buy products made from recycled materials as opposed to those items not made from recycled materials.

Never Sometimes Often Always

* 18. I recycle newspapers.

Never Sometimes Often Always

* 19. I recycle glass materials.

Never Sometimes Often Always

* 20. I turn the stereo/radio off when it is not in use.

Never Sometimes Often Always

* 21. I compost non-meat food scraps.

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 22. I use the washing machine only when it has a full load.

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 23. I buy products with minimal packaging (e.g., products that are packaged in a minimal amount of plastic).

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 24. I avoid using aerosol sprays.

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 25. I re-use plastic shopping bags for future shopping and/or other purposes.

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 26. When cleaning my teeth I turn the tap off rather than leaving it run.

Never	Sometimes	Often	Always
☆	☆	☆	☆

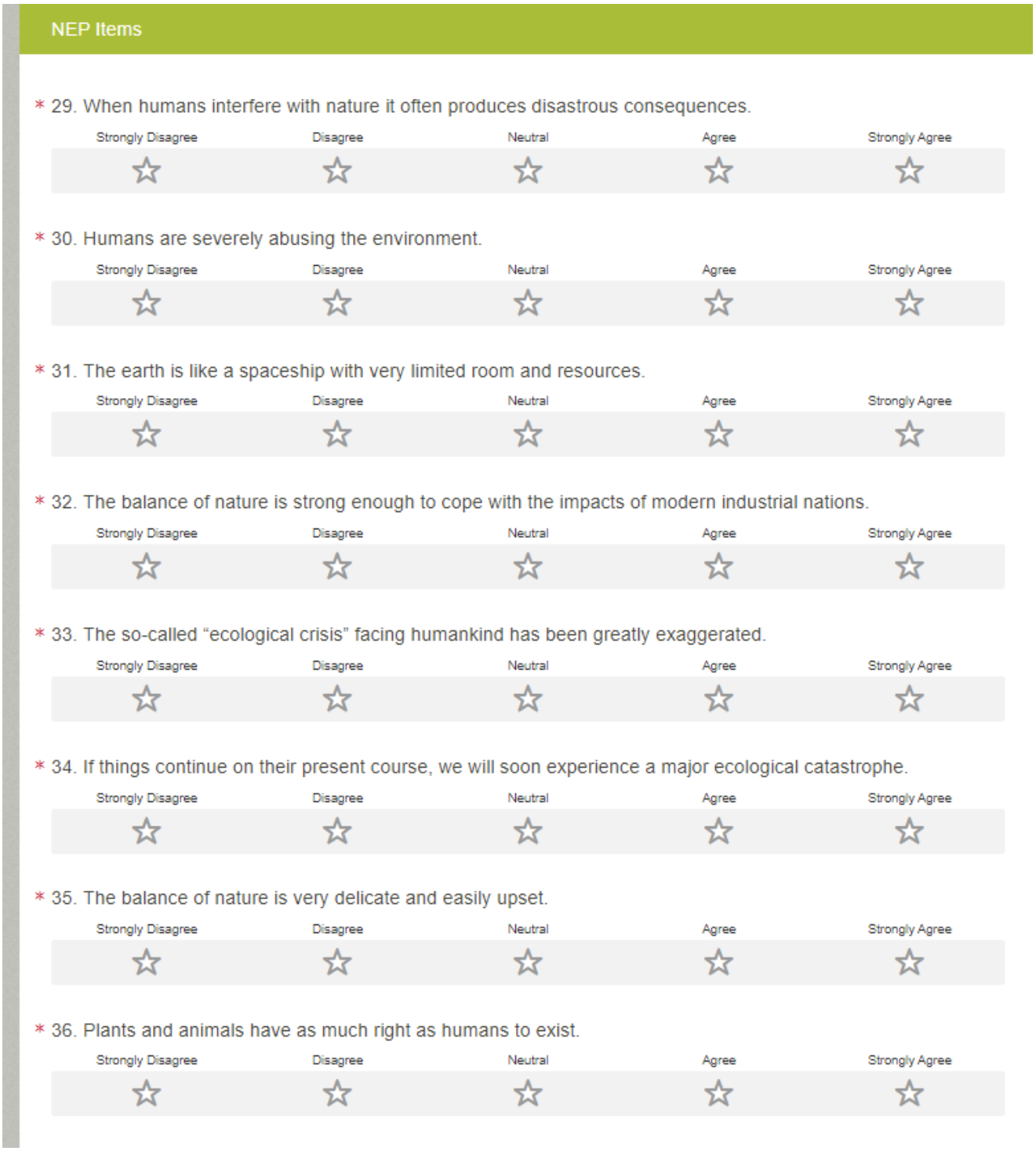
* 27. When inside, and if sufficient sun light is shining through the windows, I use sun light as opposed to artificial light.

Never	Sometimes	Often	Always
☆	☆	☆	☆

* 28. When travelling short distances (Approx. 1 – 2 kilometres) I walk as opposed to driving or taking a bus.

Never	Sometimes	Often	Always
☆	☆	☆	☆

Appendix K: Revised NEP Scale Items in Electronic Survey



NEP Items

* 29. When humans interfere with nature it often produces disastrous consequences.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 30. Humans are severely abusing the environment.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 31. The earth is like a spaceship with very limited room and resources.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 32. The balance of nature is strong enough to cope with the impacts of modern industrial nations.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 33. The so-called "ecological crisis" facing humankind has been greatly exaggerated.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 34. If things continue on their present course, we will soon experience a major ecological catastrophe.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 35. The balance of nature is very delicate and easily upset.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 36. Plants and animals have as much right as humans to exist.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 37. Despite all our special abilities humans are still subject to the laws of nature.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 38. We are approaching the limit of the number of people the earth can support.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 39. The earth has plenty of natural resources if we just learn how to develop them.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 40. Human ingenuity will insure that we do NOT make the earth unlivable.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 41. Humans will eventually learn enough about how nature works to be able to control it.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

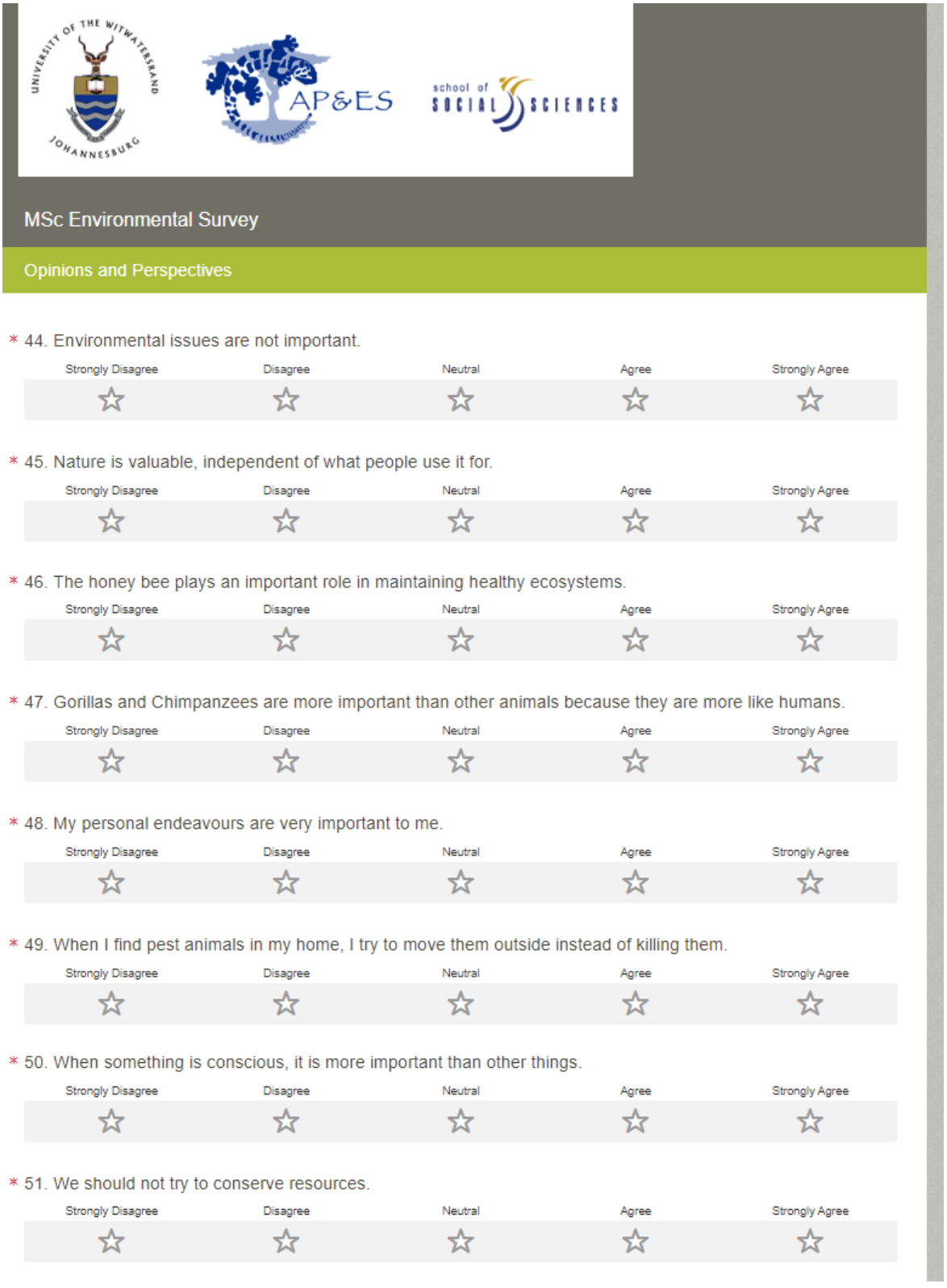
* 42. Humans were meant to rule over the rest of nature.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 43. Humans have the right to modify the natural environment to suit their needs.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

Appendix L: Original Scale's Items in Electronic Survey



MSc Environmental Survey

Opinions and Perspectives

* 44. Environmental issues are not important.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 45. Nature is valuable, independent of what people use it for.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 46. The honey bee plays an important role in maintaining healthy ecosystems.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 47. Gorillas and Chimpanzees are more important than other animals because they are more like humans.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 48. My personal endeavours are very important to me.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 49. When I find pest animals in my home, I try to move them outside instead of killing them.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 50. When something is conscious, it is more important than other things.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 51. We should not try to conserve resources.

Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree

* 52. Trees and other plants should be protected because they deserve to continue living.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 53. It is important to always try and save other people's lives.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
☆	☆	☆	☆	☆

* 54. I want to get more things that are useful to me.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 55. I am, or might become, a vegetarian because most farms do not treat animals ethically.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 56. We should avoid being cruel to animals.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 57. It is important to protect the environment for future generations.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 58. Society's needs are more important than the environment.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 59. We should improve our standard of living, even if we damage the environment.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 60. We don't need to protect anything.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 61. I find it difficult to become concerned about environmental issues that don't affect me.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 62. I place great value on things that I own.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 63. I worry that there will not be enough resources for future generations.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 64. Human life is more important than anything else.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 65. We should protect landscapes and local areas, as well as any plants and animals which live there.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 66. We should stop testing cosmetic products on animals because it harms them.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 67. All our beliefs are wrong.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 68. Something's capacity to feel pain determines how valuable it is.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 69. I do not want to recycle anything.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 70. I do not get upset when the environment is harmed.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 71. I experience a feeling of connectedness when I am in nature.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 72. The environment should only be protected unless someone's job might be lost because of it.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 73. Pollution is bad for animals and plants.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 74. If agriculture damages a natural space, the damage should be prevented, minimized, or compensated for.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 75. We should protect the environment so that all people can have a good future.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 76. Wilderness areas and species should be protected simply so that they continue to exist.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 77. If I could, I would stop people from cutting down trees.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 78. It doesn't matter what happens in the future.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 79. It is important to consider relationships between living things when planning future projects.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 80. I respect everything which is alive, just because it is alive.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 81. I become upset when a natural area is cleared for buildings or construction.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 92. It is important to grow and nurture plants, even if I can't use them for anything specific.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 93. I get upset when I find out that an endangered species died.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 94. The environment should be protected, so that I can have a good future.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 95. I will go out of my way to help something which is suffering.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 96. Areas and spaces outside the city are important areas for conservation.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 97. I do not harm pets, because it causes them pain.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 98. Ultimately, everything we do has no meaning.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 99. It is ok to feed less developed creatures, like worms, to my pets which eat them, like birds.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 100. I don't care if the environment is destroyed or damaged.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 101. Laws and regulations concerning the environment limit my choices and freedom.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 102. It is ok to damage a part of the environment if we can make a new medicine from it.

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

* 103. Natural areas should be protected so that I can enjoy them

Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
☆	☆	☆	☆	☆

Appendix M: First colourized version of the theory map

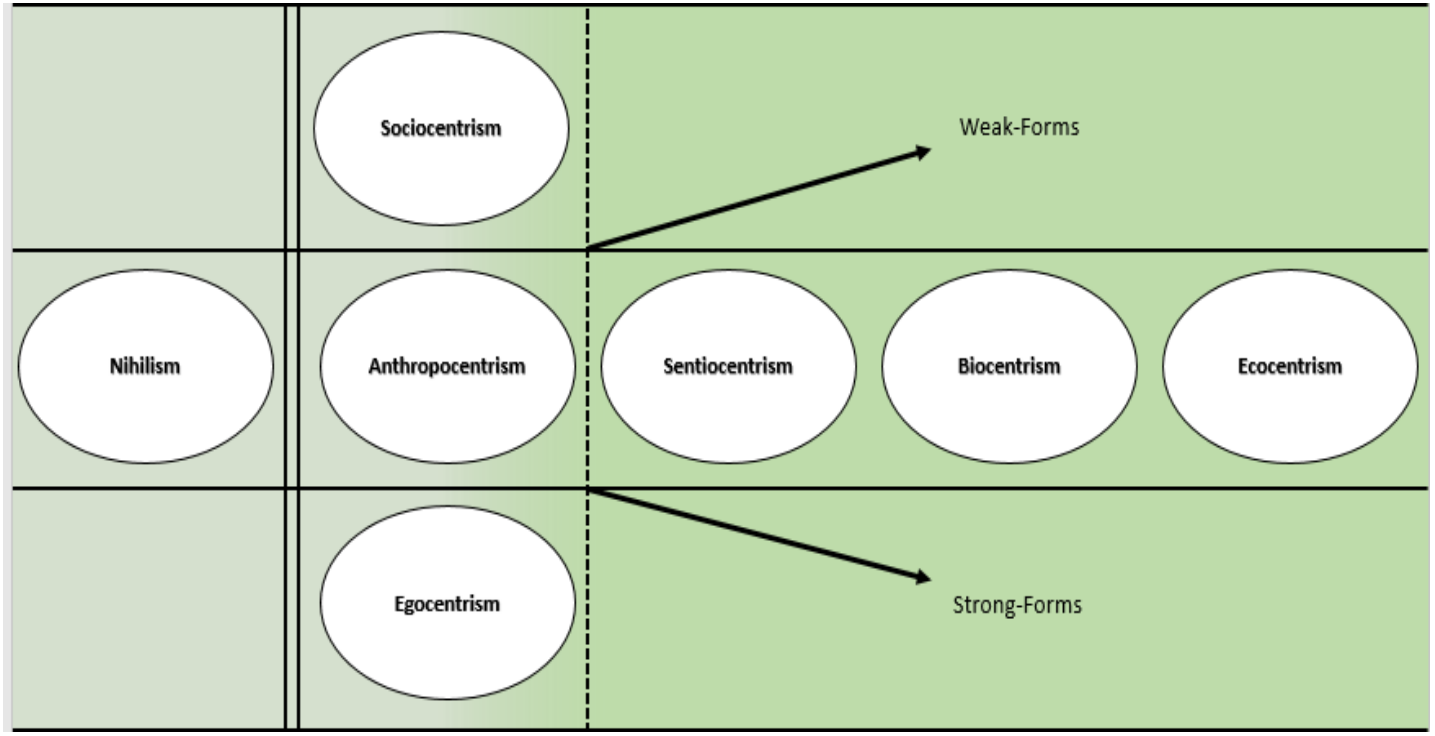


Figure 4. First colourized version of the theory map.

Appendix N: Second colourized version of the theory map

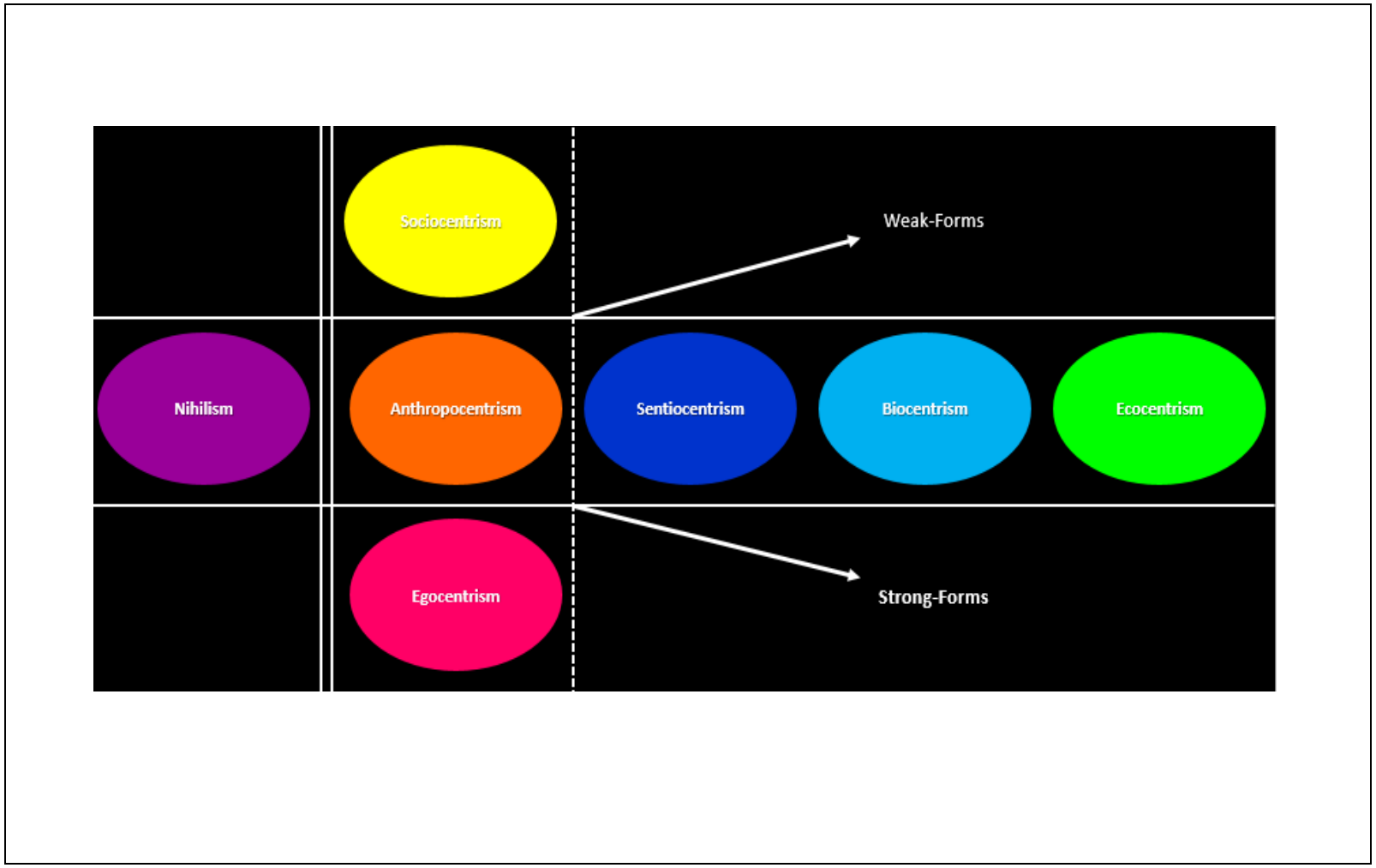


Figure 5. Second colourized version of the theory map.

Appendix O: First colourized version of the third heuristic model



Figure 6. First colourized version of the third heuristic model.

Appendix P: Second colourized version of the third heuristic model



Figure 7. Second colourized version of the third heuristic model.

Appendix Q: Ethics Clearance Certificate



school of SOCIAL SCIENCES

SOSS Human Research Ethics Committee

Clearance Certificate

Protocol Number:	PHIL/17/08/01
Project Title:	'Towards an Improved Understanding of Environmental Concern: Corroboration of Past Assessments in a South African Context and Testing of an Original Instrument'
Investigator's Name:	Björn Wessel
Department:	Philosophy
Date Reviewed:	1 August 2017
Decision of Committee:	Approved / Unconditionally
Expiry Date:	1 August 2019
Date:	23 August 2017
Acting Head of School	Associate Professor Sam Kariuki
CC supervisor:	Associate Professor Edwin Etieyibo

Declaration of Investigator

To be completed in duplicate and one copy to be returned to Ms. Rita Kruger in the School of Social Sciences, Room 152, 11st Floor, Robert Sobukwe Block.

I fully understand the conditions under which I am authorised to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. If any departure from the research procedure as approved, I undertake to resubmit the protocol to the committee.

Student Signature

1 September 2017

Date

Appendix R: Approval from Faculty of Science

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 02711 7176029
Tel: 02711 7176006

Reference: Ms Mpumi Mnqapu
E-mail: #Fac-Science-PG@wits.ac.za

12 June 2017
Person No: 322794
PAG

Mr BPB Wessel
2 Melrose Road
Sandown Estate
2031
South Africa

Dear Mr Wessel

Master of Science (Coursework and Research Report): Approval of Title

We have pleasure in advising that your proposal entitled *Towards an improved understanding of environmental concern: Corroboration of past assessments in a South African context and testing of a new instruments* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely



Ms René Vosloo
Faculty Registrar
Faculty of Science

Appendix S: Approval from Wits Deputy Registrar

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG

OFFICE OF THE DEPUTY REGISTRAR

22 June 2017

Mr Björn Wessel
MSc. Candidate
Interdisciplinary Globalk Change Studies
Student Number 322794

TO WHOM IT MAY CONCERN

"Towards an improved understanding of environmental concern: corroboration of past assessments in a South African context and testing of an original instrument."

This letter serves to confirm that the above project has received permission to be conducted on University premises, and/or involving staff and/or students of the University as research participants. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

If you are conducting research on certain student cohorts, year groups or courses within specific Schools and within the teaching term, permission must be sought from Heads of School or individual academics.

No research can commence before ethical clearance has been obtained.

Nicoleen Potgieter
Deputy Registrar

Private Bag 3, Wits, 2050, South Africa | T +27 11 717 1204/8 | F +27 86 503 2271 | www.wits.ac.za

Appendix T: Introductory Life Science Permission Letter

26 June 2017

Letter of Permission to Conduct Research on ILS students at Wits University

Mr Björn Wessel

MSc. Candidate

Interdisciplinary Global Change Studies

Student Number: 322794

TO WHOM IT MAY CONCERN

"Towards an improved understanding of environmental concern: corroboration of past assessments in a South African context and testing of an original instrument."

This letter serves to confirm that the above project has received permission to be conducted on first-year Introductory Life Science (ILS) students from Wits University. In undertaking this research, you agree to abide by all University regulations for conducting research on campus and/or on any person/s affiliated with the University in any way. You also agree that participation is entirely voluntary and will not affect students' academic results in any way, that the identity of individual participants will be kept confidential, and that you will respect participants' rights to withdraw from participation at any time. Students will have to consent to participating in the research under these conditions before any data is collected.

No research can commence before ethical clearance has been obtained.

Yours sincerely,

Prof Elisabeth Bremner

Appendix U: Economics Permission Letter

UNIVERSITY OF THE WITWATERSRAND JOHANNESBURG | WITS SCHOOL OF ECONOMIC & BUSINESS SCIENCES

5 July 2017

Mr. Bjorn Wessel
Msc. Candidate
Interdisciplinary Global Change Studies
Student Number 322 794

TO WHOM IT MAY CONCERN

RE: Permission to Administer Msc. Environmental Survey to First Year Economics Students

This serves to confirm that Mr. Bjorn Wessel, a student studying for an Msc. in Interdisciplinary Global Change Studies at Wits has been given permission to conduct the above study which involves interviewing Wits first Year Economics students. In undertaking the research the researcher must abide by all University regulations for conducting research on campus and to respect participants' rights to withdraw from participation at any time.

No research can commence before ethical clearance has been obtained.

Yours sincerely,



Tendai Gwatidzo, PhD.
Associate Professor
Head of the Economics Division and PhD Programme Coordinator
School of Economic and Business Sciences
Witwatersrand University,
P. Bag 3, Wits 2050, South Africa
Tel: 27 11 717 8114:
Email: tendai.gwatidzo@wits.ac.za
Web: www.wits.ac.za/sebs

Appendix V: Participant Information Sheet

Invitation to Participate in Environmental Research Survey:

"Towards an improved understanding of Environmental Concern: Corroboration of past assessments and testing of an Original Instrument in a South African Context"

MSc. in Interdisciplinary Global Change Studies
School of Animal, Plant and Environmental Sciences
University of the Witwatersrand
Private Bag 3, WITS, 2050

Dear Student,

My name is Björn Wessel and I would like to invite you to participate in answering my survey about environmental concern and environmentally responsible behaviour. My research is intended to improve our understanding of environmental concern through an analysis of opinions and behaviours relating to the environment. I have identified problems with certain assessments of environmental concern. I argue that these problems begin with flawed readings of environmental ethics literature, and result in ambiguous constructs and improper survey items. Additionally, it is desirable to obtain data on environmental concern in a South African context.

This research project is a critical component of my MSc. in Interdisciplinary Global Change Studies at Wits University. I hope that my research makes a substantial contribution to environmental fields such as environmental ethics, environmental psychology, and environmental education. Additionally, this research may provide a strong supporting theoretical basis for developing improved environmental-behavioural intervention strategies.

This research is being administered to groups of first-year students at Wits University. You have been selected to participate in this study because you are a member of one of these groups. Your responses to the survey are fully confidential and anonymous. No personal identifying information is recorded, so at no point will I be able to identify who you are. As such, I will be unable to provide individual feedback. However, my full research report will be available on the Wits database once it has been completed and accepted.

While I do urge you participate, should your decide against this, it will not be held against you in any way. Participating in the survey should take you no longer than 15 minutes and requires an

internet connection to submit. Please read each item carefully and respond honestly. Completing and submitting responses to this survey will be considered to indicate consent to participate and permission for me to use your responses in my research. Once this research project has been completed and accepted, it will be accessible on the Wits intranet an my MSc Research Report. This research may also form the foundation for a future publication.

Thank you for taking the time to read this information sheet and considering participation in this study. If you have any concerns, my contact details appear below.

Candidate: Björn Wessel

Animal, Plant and, Environmental Sciences (AP&ES)

Phone: 072 013 6373

Email: bjobwessel@gmail.com

Supervisor: Edwin Etiyiebo

Social of Social Sciences - Philosophy Department

Phone: 011 717 4316

Email: Edwin.Etiyiebo@wits.ac.za

End page.